ELECTRICAL WEST

WITH WHICH IS CONSOLIDATED THE JOURNAL OF ELECTRICITY

McGraw-Hill Co. of Calif. SEPTEMBER 1, 1931 Twenty-five Cents per Copy

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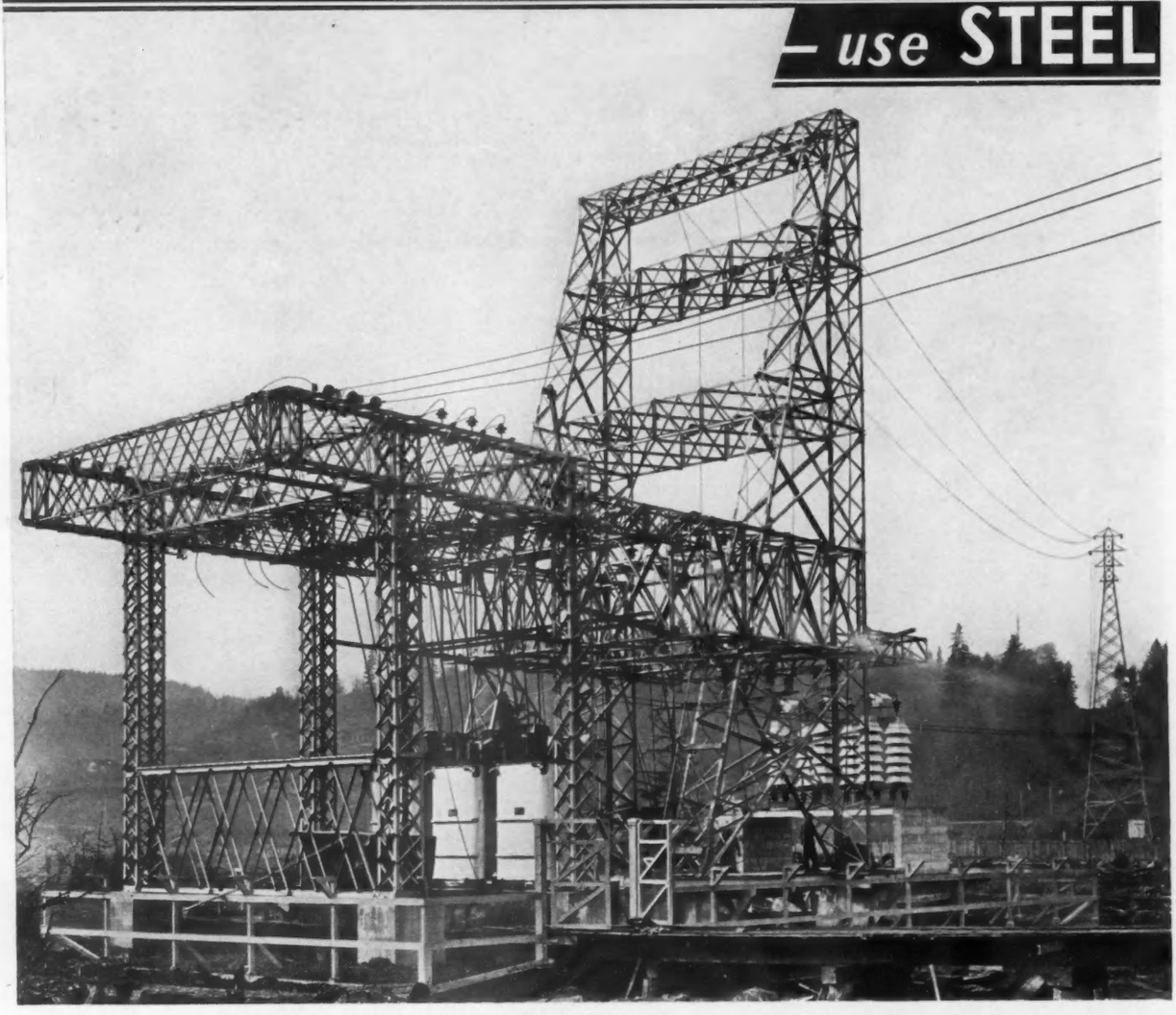

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ELECTRICAL WEST, entered as second class matter at the post office at San Francisco, under the Act of Congress, March 3, 1879. Published at 883 Mission Street, San Francisco, California, thirteen times a year as follows: January 1, February 1, March 1, April 1, May 1, May 15, June 1, July 1, August 1, September 1, October 1, November 1, and December 1.

ELECTRICAL WEST

With which are consolidated the "Electrical Journal," the "Journal of Electricity, Power & Gas," and the "Journal of Electricity"

Established 1887

McGraw-Hill Company of California

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Volume 67 | San Francisco, September 1, 1931 | Number 3

McGraw-Hill Company of California

833 Mission Street
SAN FRANCISCO

NORTHWEST OFFICE
1206 Spalding Building

PORTLAND, OREGON
SOUTHWEST OFFICE

632 Chamber of Commerce Bldg.
LOS ANGELES, CALIF

Publishers of

ELECTRICAL WEST

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ST. LOUIS, 1556 Bell Telephone Building
NEW YORK, 285 Madison Avenue
DALLAS, 303 Thomas Building
DETROIT, 2-257 General Motors Building
GREENVILLE, S. C., 1301 Woodside Bldg.

Subscription rate in the United States and possessions, Canada, Mexico and all countries included in the U. S. Postal Union, $2 per year, two years $3; elsewhere $3 gold (13 shillings), two years $5. Single copy, 25 cents. When change of address is required, both old and new addresses must be given. Notice must be received two weeks before change takes place.

Member Audit Bureau of Circulations

Associated Business Papers, Inc.

Circulation of this issue, 6,725

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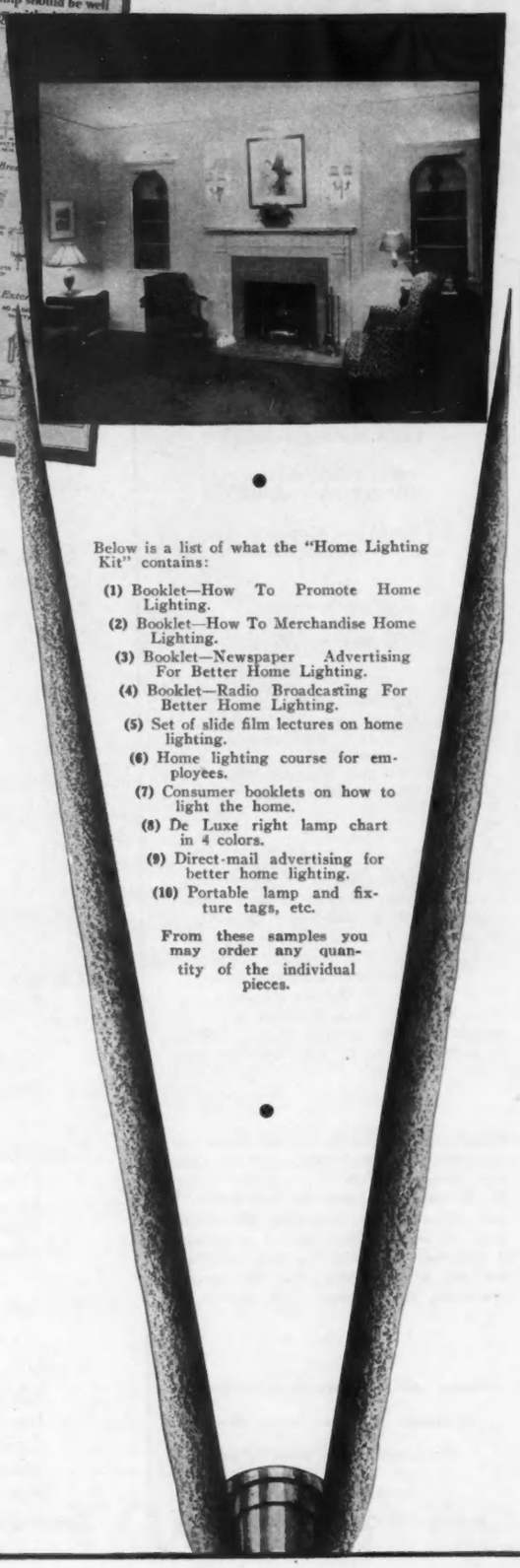

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(1) Booklet—How To Promote Home Lighting.
(2) Booklet—How To Merchandise Home Lighting.
(3) Booklet—Newspaper Advertising For Better Home Lighting.
(4) Booklet—Radio Broadcasting For Better Home Lighting.
(5) Set of slide film lectures on home lighting.
(6) Home lighting course for employees.
(7) Consumer booklets on how to light the home.
(8) De Luxe right lamp chart in 4 colors.
(9) Direct-mail advertising for better home lighting.
(10) Portable lamp and fixture tags, etc.

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©CIB 126585
SEP 12 1931

ELECTRICAL WEST

With which is consolidated the Journal of Electricity
McGraw-Hill Company of California

San Francisco, Sept. 1 1931
Volume 67
Number 3

G. C. TENNEY, *Editor*

SO LACKADAISICAL was the Hoover Dam labor strike that observers wonder if its lack of vitality was due to desert heat or perchance to pending elections.

▼

MEANWHILE, with two or more important cities deserting the Metropolitan Water District, there is cause for concern whether the appalling magnitude of the $220 millions bond issue will not make voters gasp, pause, enquire who will buy so many bonds.

▼

RATE makers' eyes focus on Puget Sound's new 8-mill off-peak water heating rate; on California-Oregon's revolutionary sliding agricultural rate based on prevailing butter-fat prices to farm consumers.

▼

PUBLIC ownership brings its annual convention to Los Angeles, therein to "study" that city's extensive system, likewise visit the scene of its fondest hope, Hoover Dam, and spread its influence over Western towns.

▼

IDAHO'S attorney general rules that municipal systems must also pay the state's new kilowatt-hour generation tax, thus balancing the scale for the first time on record.

▼

TWO fundamental disadvantages of government ownership overshadow all the statistics, charges and countercharges, the smoke of conflicting opinion, declares a clear-thinking publicist.

The Month

HUMAN relations and economics are better stuff to base policy upon than stern pugnacious adherence to technical legal rights. Regulation always tastes better when it is self-applied or at least results from friendly conference, one of the West's regulators contends.

▼

REASON aplenty underlies the prevalence of Western electrically heated schools and a new concept offers even large degree-day areas some of its advantages in combination application.

▼

INTEREST and profit attach to this month's features: a powdered fuel burning steam plant, new style pay dirt in gravel plant's modern equipment, an inspector who sells architects on adequacy, an inquiry into types and uses of underfloor duct, how a motor specialist meets the handy-man problem, what modern lighting does to illumine the bowels of Earth, the N.E. L.A.'s new set of merchandising principles, and a southwestern company that demonstrates with a successful dealer-sold cooker campaign.

Editorial

Northwest's Water Power Policies Not Conducive to Development

RECENT argument between the department of conservation and development of the division of hydraulics in the state of Washington and the Federal Bureau of Reclamation over the nature of the permit to be granted by the state to develop power on the Cle Elum irrigation project, serves again to focus attention on the laws and policies of the Northwest states with respect to their water power resources. Complex as are the legal and economic questions involved in the Washington controversy, questions on which ELECTRICAL WEST does not presume to pass judgment, the incident serves to show how little confidence the state government has in federal operation, and how jealously state officials are attempting to interpret public sentiment regarding water power.

Oregon evidenced a similar attitude when its legislature, seeking to interpret the "will of the people," passed its so-called Water Conservation Act, thinking it was saving its water power resources for the people. Actually, what that state accomplished was simply to throw so many restrictions around the development of water power that private capital is unable to undertake such development. Consequently, if the people of Oregon are to reap any benefit from these resources, they will have to attempt it through a form of socialism.

Idaho's half-mill kilowatt-hour tax is another law bearing on power development in that state, and, though its approach is from a different point of view, its effect of discouraging development is the same.

In the meantime, border-line companies at least can spend their money and enrich communities in other states. The Utah Power & Light Co. need not proceed with any further hydro-electric development in Idaho. Only threats by the Reclamation Bureau to abandon the Cle Elum project brought a compromise from the state of Washington. The California Oregon Power Co. has already abandoned an Oregon project, moving it a few miles down the river and across the line into California.

Thus the surrounding states can complacently and without much effort capitalize on the misguided policies and freak laws of the far Northwest, which has suddenly become super-water-power-conscious.

Don't Forget the Small Appliances

HOW to stimulate appliance sales, particularly small appliances, is a question that is bothering more than one manufacturer, wholesaler, commercial manager and dealer today. Various reasons have been advanced for the falling off in sales of small appliances during the last two or three years. The claim is made that when power companies ceased sales promotional effort on the smaller appliances and concentrated on the heavier load-building devices, the former suffered. With few exceptions the small appliance has been pushed into the background. This applies equally to other trade outlets as well as central stations. Where appliances formerly occupied front-of-store space today they have been relegated to some shelf in the back.

Still another criticism is made of the appliances themselves. Some of the best merchandisers contend that in design and appearance many of the appliances are obsolete. They ask for something new. They point to the success which has attended the automatic iron and toaster and ask that similar steps be taken with the percolator, waffle iron and other appliances.

From existing conditions one might judge that the entire industry has gone slightly stale on small appliance merchandising. One thing which is needed and for which the power companies should assume leadership is a balanced sales program that will include all types and classes of appliances. Efforts should not be centered around just one particular appliance but should be organized around the electrical needs of the customer. More promotion of the completely electrified home would help materially.

Can Utilities Justify "Baling Wire" Maintenance Policies?

IS A STRANGE new disease developing on account of management's too close perusal of the profit and loss statement during the current depression? Are the eyes of utility executives, which recently gazed across the business horizon in search of wider fields, losing their far-sighted vision for constructive operating practice? Does the intensive quest for means of increasing net income dim yesterday's clear perception of future business horizons?

Won't resorting to a short-sighted maintenance policy during the lean days of 1931 jeopardize fu-

ture earnings of an organization or its ability to take advantage of future opportunities? Is it good business to repair equipment at a cost equal to or greater than replacement cost? Can rehabilitation of obsolete equipment ever be justified at any cost if reliability and high standards of service are criteria of good public relations?

Is proper credit being given to long-time profits accruing from modern apparatus even though seeming economic necessity dictates that old equipment be repaired or replaced with apparatus equally antique? Was there ever a more favorable era for the retirement of material, apparatus or equipment that has given a full measure of service and today is obsolete? Will prices get lower? Will labor ever be more efficient? Won't modern apparatus capable of meeting the exacting service requirements of the light and power business satisfy both current and future demands for profitable and efficient operation.

Will business recovery be speeded if the utilities forsake niggardly maintenance policies?

Cooperative Merchandising Is in the Dealers' Interest

WHAT will be the ultimate outcome of the present power company-dealer merchandising controversy? Here is a question to which the principal parties to the controversy, namely the dealers and the central stations, seem to have given little thought. On the other hand, the manufacturers of appliances and the wholesalers, with an eye to the future, appear to be laying a foundation for a new distribution structure.

In supporting legislation designed to prohibit utility merchandising, dealers believe sincerely that they are acting in their own interest. This action is based upon the mistaken opinion that the volume of appliance business now done by the power companies will of its own accord be divided among existing dealer outlets. Keen students of merchandising and distribution know this to be far from the truth. Volume of some dealers might increase, but the total volume most likely would be diminished by the amount of business now created by the power companies.

How would the manufacturers and wholesalers who are today supplying the power companies react to this change? Would they permit this loss of volume to go unchallenged or would they immediately take steps to save it? Obviously the latter course would be followed.

At a recent meeting in Oakland one far-sighted dealer summed up the situation when he contended that cooperation from the power companies with the creation of markets for all brands and classes of electrical appliances was far more in the dealers' interest than the formidable competition of new outlets owned or controlled by manufacturers. If he is right, then the dealers will encourage a continuation and extension of the cooperative activities that are now a part of the commercial policy of practically every Western power company.

A Job for The Women

WOMEN'S committees have not yet lacked work to do, even though their inception has been a recent thing in the electrical industry. Beginning with the idea of acquainting themselves with the work of their companies so that they could explain and uphold it to their friends outside, their scope of activity has enlarged to include self-development in public speaking, the better to accomplish their first objective, and home service, in order to acquaint themselves and their friends with the part electrical appliances play in modern living.

Out of the recent N.E.L.A. convention a keen observer and far-sighted mere man, listening to the editor of one of the leading women's magazines speak, conceived a still greater responsibility which the women of the electrical industry might assume. Said he:

"The next and bigger step, I believe, is going to be an advisory service to home makers. The women should organize to help the new family find a home, help the young couple build a new house or re-equip an old house, to set up a financial budget and an operating program to meet the new conditions. They could work with the real estate people, the architects, mortgage bankers and like agencies, and give a free service to help people organize the operation of homes in tune with present economic conditions."

Even a moment's thought to the far-reaching consequences of this personal, intimate, helpful relationship with new home owners, with strangers entering a community, with young couples starting off on that first hazardous domestic adventure, will awaken an appreciation, almost breath-taking in its possibilities, of this significant suggestion to the women's committees. If first impressions are as lasting as claimed in the old adage, what an opportunity this idea holds!

Regulation by Conference Versus Formal Rate Proceedings*

By LEON O. WHITSELL
Member, California Railroad Commission, San Francisco, Calif.

In Which the Author Brings to Bear Six Years of Experience in Regulation by Proposing That Informality Replace Formality in Rate Matters and That the Utilities Take Voluntary Action Which Will Make Them Largely Self-Regulating

REGULATION in California under the Public Utilities Act has been a success. I am not in sympathy with the idea sometimes expressed in high places that the regulation of public utilities by state commissions has proved a failure and that some other method or system should be adopted in lieu thereof. The people of California have full confidence in the utilities act and in their Railroad Commission. This is evidenced by the fact that at practically every legislative session since 1912, through their representatives, they have enlarged the act by amendment and have thereby continued further to clothe the Railroad Commission with additional powers and jurisdiction, until today California stands at the forefront among the states having a regulatory act which adequately covers practically every phase of public utility regulation. In fact, but few states have conferred upon their regulatory bodies the plenary powers possessed by the California commission.

Under the administration and policy of the California commission, the people have continued to enjoy adequate service at reasonable rates—industries have grown up and have experienced a great measure of prosperity. Rural electrification has kept pace with the progress of the state, and the farm load has shown a gradually ascending curve. The domestic use of electric power has continued to increase and it has become the first essential of the home.

The utilities have likewise grown and prospered under regulation; they have been allowed to earn a fair return upon a fair value of the property used and useful in the public service. They have been able, under regulation, to obtain money at reasonably low rates and to finance their undertakings adequately and at all times meet the demands for expansion and keep step with the development and progress of the state. Jurisdiction of the commission over utility financing has proved the wisdom of those responsible for its incorporation into the act and has fully justified the hopes and anticipations of the people. The commission's policy pursuant to that jurisdiction has lowered the cost of money to the utilities. It has stabilized the entire financial structure of the utilities. The commission's scrutiny of security issues by the utilities has instilled in the minds of the people a comforting sense of safety in the ownership of the different issues authorized. Watered stock and overcapitalization are things of the past in California utilities.

RATE PROCEEDINGS UNECONOMICAL AND WASTEFUL

For several years there has been a growing feeling on the part of a great many thinking, serious-minded people in California that long, contentious rate proceedings are uneconomical and wasteful and that the utilities should give some thought toward working out a way by which the enormous costs incident thereto may be avoided. In this dicussion I have in mind not only the costs but the harmful results which necessarily flow therefrom irrespective of the results attained in the final determination of the case.

From the very inception of a proceeding to raise or reduce rates, the utilities, the municipalities and other representatives of consumers are resolved into belligerent camps of offensive and defensive; suspicion and accusation run rampant. Advocates of the consumer oftimes anticipate the final result and broadcast what to them seems the inevitable decision of the commission. The utility with its auditors, engineers and lawyers buckle on the armor of defense and the battle is on. Good public relations cultivated through long years of patient effort take wing and irrespective of the decision of the commission, scars are left on each side which continue as an irritant and a reminder of a contest which in many cases could have been avoided by the utility through the use of the same degree of good judgment exercised in other walks of business life.

I will now direct your attention to the other phases of this question and will discuss them entirely from the standpoint of methods and policy—advisedly ignoring and brushing aside legal considerations. In my judgment, the remedy to be applied does not lie in the realm of the law but in that of human relations and economics.

I will endeavor to outline my ideas as to how the utilities can improve conditions by voluntary action and thus, in a measure at least, become largely self-regulating in so far as the adjustment of rates is concerned. I refer to what I choose to call regulation by conference vs. formal proceedings. Conference with the commission and its staff in the performance of the regulatory functions is not new. Much good has been accomplished in the past in this and other states through amicable adjustments effected around the conference table, and I believe that much more is to be accomplished in the future.

REGULATION BY CONFERENCE

Since the inception of regulation in California in its present form in 1911, the public, the municipalities through their representatives, and the public utilities acting through their officers have found that the commission and its various experts are at all times ready and willing to discuss complaints or problems and to take such action as may be deemed necessary to adjust expeditiously differences which have arisen. However, it is only within the past few years that the utilities of the state have shown a disposition to meet with the commission in con-

* Address presented before the convention of the Pacific Coast Electrical Assn., Del Monte, Calif., June 25, 1931.

ference with representatives of the public and seriously discuss voluntary rate adjustments. Within the past few years there has been in evidence a wholesome willingness to do this very thing.

By means of such conferences substantial rate reductions have been voluntarily effected by the Pacific Gas and Electric Co., Southern California Edison Co. Ltd., San Diego Consolidated Gas & Electric Co., and by other large electric utilities of the state. I am confident, however, that this method has not been used in many instances where the facts and circumstances fully warranted it. I am of the opinion that certain executives are still somewhat skeptical and loathe to participate in such conferences, especially when a rate proceeding is imminent.

Possibly they are apprehensive lest their willingness to participate in such informal discussions may be misconstrued and taken as evidence of the weakness of the position they may eventually elect to assume; or possibly they fear that they may inadvertently or otherwise disclose facts which may be used against them. If either assumption be correct, I feel certain that they are laboring under a misapprehension. To my mind conferences of the kind and character I am now discussing, to be productive of the greatest good to all concerned, must be entered into with the distinct understanding that, in the event a satisfacory solution of the problems under discussion is not mutually agreed upon, the positions taken or facts developed by either party shall not militate against them in the final determination of the matter except in so far as those facts may be developed by evidence other than the conference admissions.

I am advised that the American Bar Assn. has within the past few months appointed a committee for the purpose of studying improvement in procedure before public utility commissions and that the principal investigation to be undertaken is the matter of increased informality in rate proceedings. Ways and means are to be found for increasing the use of such procedure. It is simply another indication of a widespread realization that adjustments by conference are desirable and constitute a wholesome substitute for costly rate litigation.

I do not wish to be understood as advocating the doing away with regulation nor the scrapping of the machinery by which the intent and purpose of the several provisions of the California Public Utilities Act are administered. I believe that through the instrumentality of the commission, the utilities by the assumption of a proper cooperative attitude can remedy this situation, which will result in an era of good feeling throughout California and will enable them to exert all their energies toward the rendition of good service instead of a continual sharpening of pencils and an indulgence in that nerve-wracking, public-relations destroying propensity sometimes facetiously characterized as the "bankers' complex." But even to approach an approximation of this happy result one concession must be indulged in by the utilities. I refer to that ever-recurring demand for a valuation for rate fixing purposes predicated in the main upon reproduction cost new with its guilty handmaiden, that unconscionable intangible known as "going concern value."

Historical Cost Valuation

Proof of the wisdom of any policy of the commission I think may be justly and righteously judged by the results which, through a series of years, follow therefrom. The California commission has consistently for a great many years arrived at its valuation of utility properties for rate making purposes by the use of the historical cost or prudent investment factor. By a liberal allowance for development costs it has practically ignored claims for large going concern value. What has been the effect on the utilities of this policy and practice of the commission?

It has not been the means of forcing a single utility in California into the hands of a receiver. On the contrary, except in cases where other causes intervened, it has maintained the utilities in good business condition. They have steadily expanded and experienced a reasonable degree of prosperity under regulation. This policy on the part of the commission has not frightened capital from the utility field. Development money has at all times been readily attainable and the utilities have experienced but little difficulty in quickly disposing of their numerous security issues. I think I am fully justified in the conclusion, from the results attained, that the commission's policy with respect to valuation has proved to be eminently fair and equitable and has not interfered with natural and normal development of the utilities.

A disposition on the part of the utilities to forego their insistence on a valuation based primarily upon reproduction cost new will impress the people with the conviction that they do not want the pound of flesh but are willing to accept a valuation based upon the money actually and prudently invested in the undertaking. Prudent investment is a term easily understood by the people and carries with it none of the highly speculative considerations involved in that rather unpopular factor, reproduction cost new.

Why should an electric utility in California contend for reproduction cost new for rate fixing purposes? There is not an electric utility in this state which, from the standpoint of enlightened self-interest, would attempt to operate its business on rates based upon reproduction cost new built upon the highly speculative and exorbitant methods of establishing that character of valuation. In my judgment, other forms of competitive power, the potentiality of municipal ownership operation, and the normal economic limitations of the consumers eliminate any possibility of the successful application of an electric rate schedule in California based upon that factor.

In fairness, I might say that the vast majority of the California utilities have rather reluctantly but in the end graciously accepted the commission's policy with respect to prudent investment and going concern value and have refrained from seeking relief in the courts. However, there appears to be a growing tendency of late to insist on the full measure of what they conceive to be their technical legal right under certain decisions of the Supreme Court of the United States, and should this tendency become widespread among California utilities, I would not care to be held accountable for what may in all human probability follow.

The tendency in this direction in California is not singular. It is in evidence in other states. It has stimulated serious thought and various suggestions have been offered as to how to treat the problem. It has been suggested in some quarters that commissions should be given larger appropriations in order that they may go throughout the land and obtain leading experts of the country on valuation problems, such as going concern value, water rights, etc., and in every case prepare a record that will stand assault in the courts, the commission thus adopting an attitude of willingness to litigate. This is obviously not the sound way to meet the problem, and if such a policy is to be adopted by some of our Eastern states (as appears to be the case) I am fearful that it will work to the disadvantage of all concerned, the public and the utilities alike.

An electric utility which is allowed its operating expenses, including depreciation and taxes, and a fair return on the amount prudently invested in the properties, which fair return is substantially in excess of the cost of money to the utility, in my judgment has no just cause for complaint.

Voluntary Rate Reductions

What remedy am I suggesting? Simply this: When the utilities see that their rate of return is exceeding the rate ordinarily allowed by the commission that they voluntarily work out a reduction and obviate the necessity of action on the part of the commission or the consumers. This is probably an easy way to adjust rates donward, but what if the rate of return falls below that allowed by the commission? Well, it's a poor rule that won't work both ways.

In that event come to the commission, lay your cards on the table, as many utilities have done. Present all of the facts reasonably necessary to arrive at a just conclusion. If the commission, after investigation by its engineering and finance departments, finds that your informal showing is correct and that you may unjustly suffer without an increase of rates, I believe it will, in keeping with its well-established policy in the past, call an informal conference to which will be invited representatives of the consumers, and it will then be determined if by conference and cooperative effort some equitable measure of relief cannot be effected without the necessity of a long, expensive hearing. This may not under our present law eliminate the necessity for a formal hearing, but it will go a long way toward shortening and softening the formal proceeding.

Regulation of public utilities by state commissions has proved highly successful, at least in California, but the procedure of such regulation as applied to the determination of rates for public utility service might well be changed from one of legal contest to one of open, frank consideration of the problems involved, with the idea on the part of the utilities of sharing with the consumers, through voluntary adjustments in rates a fair and equitable portion of their earnings if such be in excess of what may be deemed reasonable.

Formal rate cases, in the majority of instances, are of necessity long-drawn-out proceedings, slow of movement and extremely expensive both to the utilities and to the state. They involve extensive legal and technical preparation and argument and invariably develop into bitter contests with consequent antagonisms which often partially or wholly nullify the effect of years of effort in the building up of desirable public relations. They also force an unavoidable delay during the pendency of the proceedings of the granting of relief to the party seeking such relief which is irritating to the patience of all concerned.

No matter what may be the outcome of such proceedings, it is extremely difficult for the average layman or consumer to grasp the full story in all its details and to justify in his mind the tremendous expenditure of time and money involved in these ever concurring contests. And the loss of time involved is a real loss. It occupies the full time during many months of a substantial portion of the personnel of both utility and state organizations which might well be otherwise spent in efforts to improve and perfect service which the utility is in the business of rendering.

So I say, in all seriousness, that the most obvious improvement of the present system of regulation would be the doing away with these extended legal contests and the substitution therefor of voluntary action on the part of the utilities through conferences with the commission, whereby and whereunder voluntary rate adjustments may be put into effect from time to time consistent with the maintenance of a reasonable rate of return upon the capital prudently invested. Such action will certainly remove many of the objectionable elements involved in the handling of rate adjustments, will be a powerful factor in the building up of general good will and confidence, will further eliminate the expenditure of large sums of money and time, and will afford prompt relief without undue delay.

▼ ▼ ▼

Socialization or Private Enterprise?

The Driving Force of Incentive Which the One Lacks Is the Lure Which Makes the Other So Attractive

By W. H. Onken, Jr.

IN THEORY, there is no reason why a municipality or a state cannot erect as good an electric light and power plant as a private company. The government can hire as good engineers, it can purchase as good equipment, it can raise money more cheaply, and it gives to the project the equivalent of a bonus or subsidy, in that it does not require it to pay taxes.

In reality, experience proves that notwithstanding all the advantages possessed by a governmental undertaking, private enterprise, in this case an electric light and power corporation, more often than not renders a better service at less cost. This is due to two outstanding and very obvious disadvantages of governmental enterprises.

The first of these is political interference in the operation of the project; the second is lack of incentive. Where there is no opportunity for personal gain, in the shape of social prestige, power or money, directing interest in the enterprise soon wanes. Incentive is without doubt the great spur or motivating force back of private enterprise, and that government takes away without being able to offer a satisfactory substitute.

But the great and compelling objection to governmental operation of electric light and power systems by either municipality or state, is that such ownership and operation is not a governmental function, and when a state or a city engages in such work it really goes into business. The highest courts in the land have repeatedly so declared.

How the Courts Have Decided

For example, in the case of Oakes Mfg. Co. vs. City of New York (206 N. Y. 221), it was held:

"A municipality in operating a system for supplying water to ordinary customers on payment of rates acts not in a governmental capacity but as the proprietor of a corporate business wherein it is subject to many of those principles of liability which would apply to a

private individual in the conduct of a similar business, and under those circumstances it becomes liable for breach of contract or for negligence."

In the exercise of its powers a municipality may act in a sovereign or governmental capacity, for which it may not be called to account, or in a proprietary or business capacity, for which it becomes responsible like any other private enterprise, though the advantages or earnings, if any, redound to the public benefit.

To quote the United States Supreme Court in the City of Los Angeles vs. Los Angeles Gas & Electric Corp. (251 U. S. 32, 38, 39):

"The court reasoned and concluded that what the city did (establishing a lighting system) was done not in its governmental capacity—an exertion of the police power—but in its 'proprietary or quasi-private capacity' and that therefore the city was subordinate in right to the corporation, the latter being an earlier and lawful occupant of the field."

In the case of the Metropolitan Utilities District vs. City of Omaha, Neb. (198 N. W. 858), the court held:

"The construction, operation or maintenance of water and gas plants by municipal corporations is not an exercise of governmental function, but is rather in the nature of a private enterprise for the convenience, advantage or benefit of the municipality, its inhabitants and property owners."

Again, in the case of Butler vs. City of McMinnville, Ore. (268 Pac. 760), it was held:

"When a municipality undertakes to supply water to its citizens for profit it is acting in its 'proprietary capacity,' as distinguished from its governmental functions."

In another case, that of Twohy Bros. Co. vs. Ochoco Irrigation District, Crook County, Ore., et al. (216 Pac. 189), the court said:

"The construction, operation and maintenance of waterworks, gas works, and lighting plants by a city for the benefit and convenience of its inhabitants constitute the exercise of private and proprietary powers."

Difference Between Government and Business

Cities and towns are not liable for personal injuries resulting from acts and omissions of their governmental agents. If one is run over by a fire engine he cannot recover damages from the city. But when cities engage in enterprises of a non-governmental nature like an electric light and power system for the private benefit of their inhabitants, they are subject to the same common law and statutory liabilities as are imposed on individuals and private corporations.

Moreover, when the state or the municipality undertakes to supply electricity to its citizens, it is engaging in business which experience shows is better handled by, and should be left to, private companies. Government should not enter into competition with its own citizens.

These reasons, to be sure, have not stopped municipalities from engaging in the electric light and power business in the past, nor are they likely to act as a deterrent to municipalities desirous of engaging in private business in the future. Socialistic ventures will always be foisted on a democratic people unless they are ever vigilant and zealous in defense of their institutions.

But and if the municipality is to engage in the electric light or in any other private business, where shall the line be drawn? What business will be exempt from governmental usurpation?

The plea is made that electricity is vitally essential to modern civilization, and that therefore the government is justified in engaging in the business in the interest of its citizens. The fact that there are many other things more essential than electricity is overlooked.

Since the creation, men have progressed without the aid of electricity. Electric service, as we know it today, is not yet 50 years old. If, then, prime essentials are to govern, should not consideration first be given to things vital?

Socialization of Land

Was there ever a time when the human race existed without food? Of all the elements absolutely essential to human existence, the chiefest is food. Therefore, if the government in its solicitude for the well-being of its citizens, is to engage in any business at all, that business obviously should be agriculture.

All communists and socialists regard the socialization of land as highly essential to the success of any communistic or socialistic existence. As a matter of fact, in all the communistic schemes proposed or carried into execution from Plato's day to the present, ownership and tillage of land in common has been practiced.

That none of these schemes has succeeded, even under highly idealistic circumstances like those which animated the Oneida Community in New York, is the best evidence of their impracticability. Attempts to subordinate individual incentive for a common cause have invariably ended in failure. Selfishness or self-interest may savor of tawdriness to the idealist, but they are natural and compelling human traits, and will in all likelihood be found in man as long as mankind exists.

The Farmer an Individualist

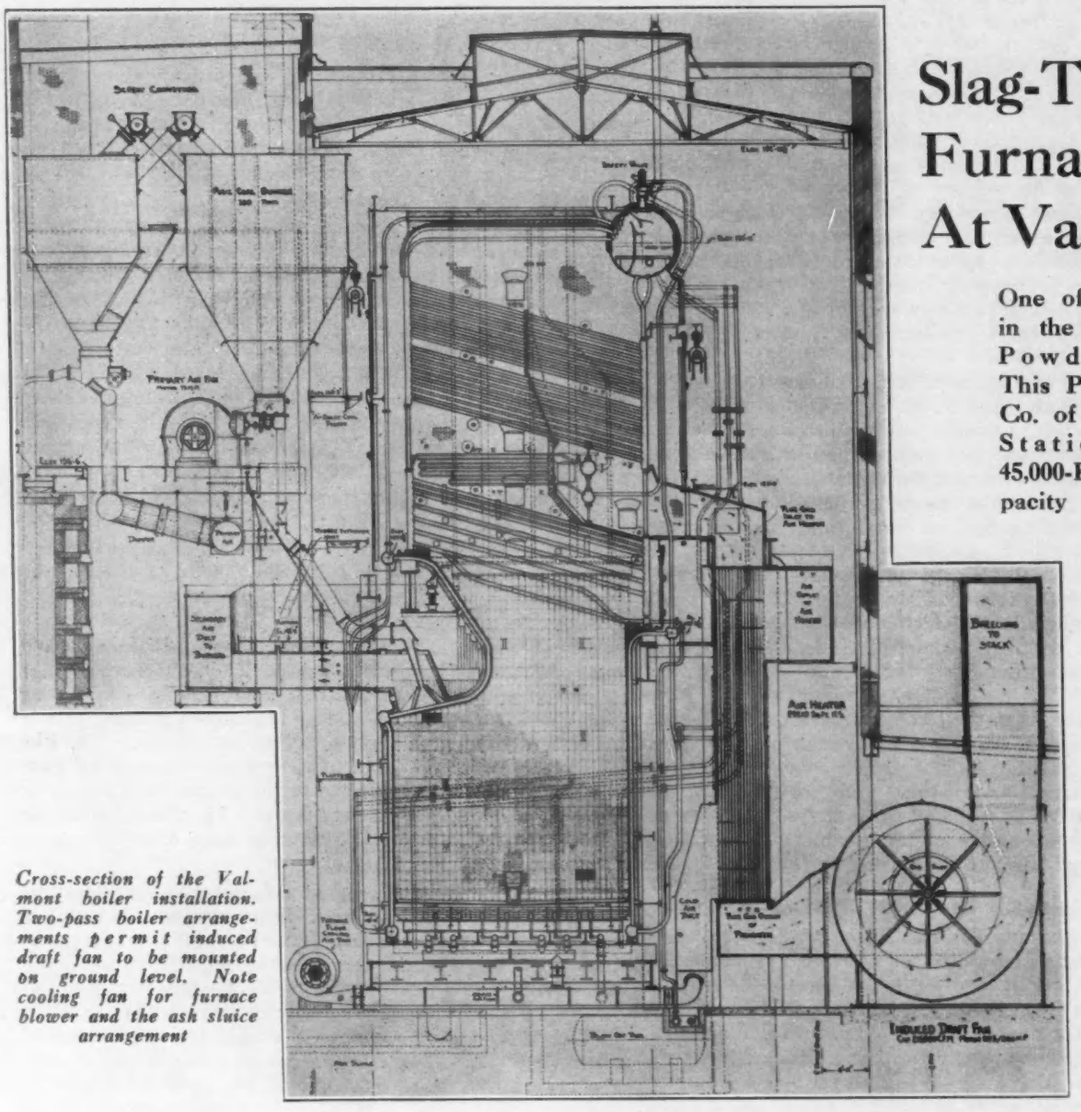
This is the reason why socialization of land has made no headway in the United States. The American farmer is essentially an individualist, and besides contending for, interprets very literally his constitutional rights to life, liberty and the pursuit of happiness. He, like every other upright citizen, recognizes the need of government, and is ungrudging in his support of it so long as it does not seek to encroach upon his prerogatives, or compete with him in the raising and distribution of farm produce.

Cooperation with his fellow-farmers seems natural enough, but cooperation with the government is another matter. The farmer expects governmental advice regarding agriculture, and even government aid in securing preferential freight rates or price preferential for his produce; but if the government or anyone else tries to dictate to him in the operation of his farm, he becomes vociferously rebellious. Whoever else may stray or err, the farmer is regarded as one of the great bulwarks in the maintenance and perpetuation of the American institution of private initiative and enterprise.

Therefore, it is unlikely that the farmers of Oregon, for example, through the Oregon State Grange, will array themselves for long against private initiative and enterprise in the electric light and power business in that state. It cannot be that the Golden Rule has lost any of its power among these God-fearing people. Nor is it within the range of chance that they are ready to remove the ancient landmarks and to sell their birthright for a mess of pottage.

Such farms as now have electric service, and they number about three-quarters of a million, receive it not because of the municipality or the state, but because a privately owned electric system has brought it to them. Other farms are being served from the networks of private electric light and power companies at the rate of a hundred thousand a year.

When those who operate the public utilities and those who till the soil shall sit down and reason this question out together, the farmer will be found on the side of right and justice, for only by reasoning can he learn the truth, and always "truth beareth away the victory."



Cross-section of the Valmont boiler installation. Two-pass boiler arrangements permit induced draft fan to be mounted on ground level. Note cooling fan for furnace blower and the ash sluice arrangement

Slag-Tap Furnace At Valmont

One of the Largest in the West Using Powdered Fuel, This Public Service Co. of Colorado Station Now Has 45,000-Kw. Peak Capacity

HIGH efficiency and over-all plant economy were dominating factors in the design of the recent addition made at the Valmont station of the Public Service Co. of Colorado. Installed to increase the steam generating capacity of the plant, this addition consists of a boiler and pulverizing equipment which, at its highest rating, produces a maximum of 275,000 lb. of steam per hour, and enables the plant to carry a peak load of 45,000 kw.

The new boiler is a Babcock & Wilcox cross drum water tube boiler with vertical forged steel sectional headers. The boiler tube surface is made up of 40 sections in width, each section composed of two banks of tubes with an interdeck superheater between. Each section is 23 tubes high, the tubes being 20 ft. long. Total heating surface of the boiler is 21,398 sq.ft. with the slag screen having an additional 1,050 sq.ft. The maximum steam working pressure in the boiler drum is 425 lb. per sq.in. As the boiler baffles are so installed as to give a two-pass arrangement instead of the customary three-pass, it is possible to place the air heater and induced draft fan on the ground level without the use of relatively long interconnecting flues. Measured from the furnace floor to the downtake headers, the height to the latter point is 25 ft. The boiler is equipped with a convection-type superheater providing an additional 4,140 sq.ft. of heating surface.

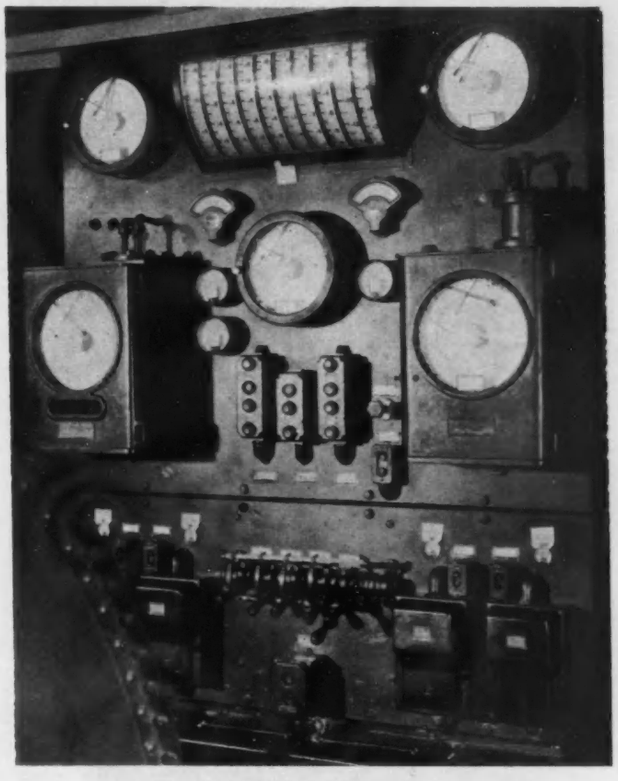
Combustion equipment is particularly interesting from the Western utility viewpoint as the abundance of other types of fuel has made coal-burning plants infrequently used in this section. This station burns powdered coal delivered to the burners by means of a 16-in. screw conveyor having a maximum capacity of 100 tons per hour. To supply the added amount of pulverized fuel necessary for the new boiler equipment, a 15-ton pulverizer with dust-recovering auxiliary equipment was installed. The general layout of this apparatus is shown in the accompanying diagram.

Powdered coal, the amount of which is automatically controlled to suit firing requirements, is delivered to a chamber where it is mixed with the proper amount of primary air, after which the mixture is admitted to the

burner. Surrounding the burner is a chamber from which preheated air is admitted to the furnace in such a manner as to combine with the fuel mixture to increase the temperature and efficiency of combustion. Four burners, so arranged in the lower section of the furnace arch as to direct the flame downward, are thus supplied. Easy ignition of the powdered coal is insured by using an oil torch system which consists of a small motor-driven pump which pumps crude oil from an 800-gal. storage tank over the pilot burners. Preheating materially increases the efficiency of combustion, at the same time improving the refinement of control.

Combustion conditions, requisite for the most economical operation, are obtained by means of a control panelboard placed on the firing platform. This control panel in addition to the equipment necessary for controlling fans, motors and conveyors, contains the complete indicating and recording metering equipment necessary to inform the firemen of the exact conditions under which the plant is operating.

As the boiler, combustion and control equipment is similar to that of the most modern powdered fuel plants, their detailed description is not necessary. However, the furnace design and construction is important as it embodies features new in this section of the country. The furnace below the boiler is of Bailey water-block



Compact combustion control panel located on the firing platform

construction on all four sides. Continuous operation at relative high ratings with complete protection to the lining is made possible in this manner in addition to increased economy and flexibility of control. By use of the water wall an additional 2,184 sq.ft. of heating surface is provided.

For the first time in the West, a slag-tap type of furnace is used. This latest and most improved method of ash removal can be used only with the fuel having an ash fusion temperature sufficiently low as to permit the

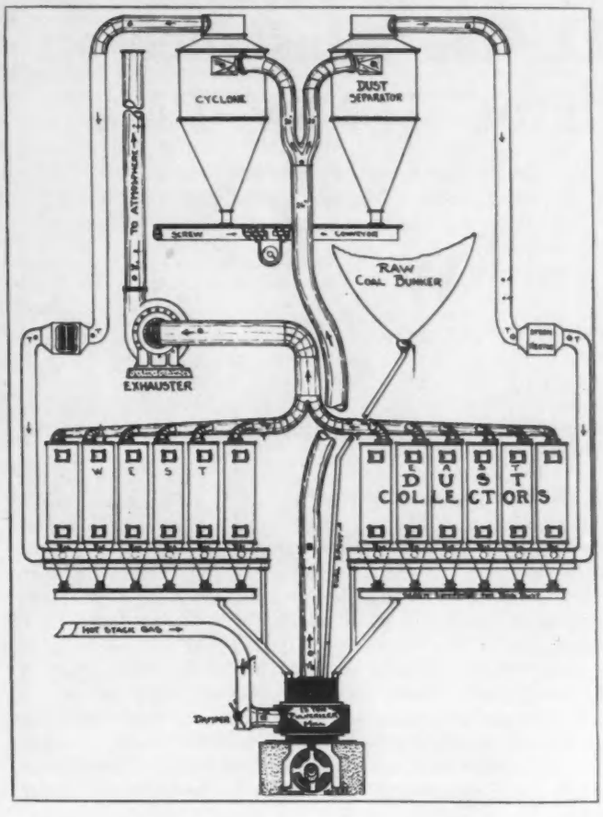
PERFORMANCE GUARANTEES

VALMONT STATION BOILER

Boiler rating	100%	200%	300%	400%
Lb. steam per hr, (actual)	68,750	137,500	206,250	275,000
Steam pressure on drum (gage)	377	382	391	402
Steam press. S.H. outlet (gage)	375	375	375	375
Superheat (deg. F.)	156	181	213	221
Per cent moisture in steam	0.5	0.5	0.5	0.5
Temp. of feed water (deg. F.)	330	330	330	330
Per cent CO_2 at boiler outlet	15	15	15	15
Temp. of flue gases leaving boiler (deg. F.)	505	560	665	785
Temp. of flue gases leaving air heater (deg. F.)	265	315	382	456
Temp. of air entering air heater (deg. F.)	80	80	80	80
Temp. of air leaving air heater (deg. F.)	415	422	474	537
Efficiency of boiler, steam heater, air heater and furnace	85.1	83.8	82	80.1
Lb. of coal burned per hour	8,840	18,320	28,380	38,850

removal of ash in a molten condition. When a fuel having the above property is to be used exclusively, the slag-tap furnace has many advantages both as to first cost and as to operating considerations. This new type of furnace has a number of advantages, foremost among which is the easier and cleaner ash disposal. The slag is tapped from the furnace once in 24 hours. To make ash removal by this system possible, the furnace floor is of the flat-bottom type having a slight slope toward a slag spout. It is suitably lined and sealed to allow the accumulation of molten slag without leaking. By arranging the burners so that the flame is directed slightly downward, sufficiently high temperatures are maintained on the floor to keep the slag in a molten condition and to consume all the combustible material in the fuel, there being no carbon content in the ash removed in this manner. Through specially designed passages in the lining, air for cooling the floor is admitted, the air being

Diagram of the pulverizing equipment installed producing a maximum of 100 tons of powdered fuel per hour for the new installation



discharged into the preheater to utilize the heat absorbed during its passage.

Ash removal then resolves into a suitable slag disposal system. Briefly, the slag is solidified by contact with cold water and sluiced into the ash pit. This is accomplished by periodically tapping the accumulated slag from the furnace through the slag spout and into a chamber provided with a number of high-velocity water jets. These solidify the slag and at the same time provide a transporting medium to carry it to the slag disintegrating chamber where, under the influence of another high-velocity jet, the solidified lumps are driven against a smashing plate and broken up by the force of the impact. The transporting jet delivers 170 gal. of water per minute at 100-lb. pressure and imparts a velocity of approximately 60 mi. per hour to the particles. Much reduced in size, the particles then enter the sluicing trenchwork where additional water jets convey them to the ash disposal pit. The pump providing water for the sluicing system delivers 2,315 gal. of water per minute at a pressure of 110 lb. and is driven by a 300-hp. motor. To prevent the abrasive slag particles from wearing the seal on the pump, the main impeller is supplemented by a four-vane auxiliary impeller to which is fed clean water from the city mains. The action of this water keeps the sealing surface from being subjected to abrasion. As the solidified slag has remarkable abrasive qualities, all portions of the disposal system must be constructed of wear-resisting materials, particularly those sections which are in contact with the high-velocity particles.

Although most of the larger steam plants in the West are designed to use a variety of fuel, including powdered coal, the Valmont station is one of the few of the larger installations to use this fuel exclusively. The accompanying table of performance guarantees gives an idea of the boiler performance which may be expected from using this combustible.

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Dampers Installed on "Hot" 110-Kv. Line

By P. J. Ost
Chief Electrical Engineer, City of San Francisco

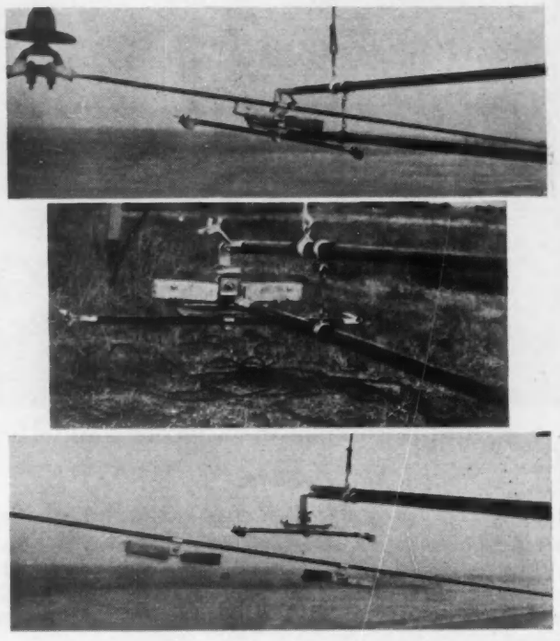
WORKING on "hot" lines has become an economical necessity in the solution of many of the circuit problems of modern systems. The use of specially designed tools and strict supervision have materially reduced the hazard of this type of work, and many cases of actual economy resulting therefrom have stipulated widespread interest in its further application, particularly on lines of higher voltages.

A noteworthy project was recently undertaken by the electrical department of the City of San Francisco which will consist of installing some 10,600 vibration dampers on its Hetch Hetchy transmission line. This line is of double-circuit, steel-tower construction, carrying two 110-kv. circuits of 397,500-circ.mil A.C.S.R. conductors suspended from ten-unit insulators. There have been indications that continued vibration of conductors on account of air currents is resulting in the breakdown of the conductor strands. Investigation of this phenomenon has been actively pressed in the past few years by both the operating companies and the manufacturers, and has resulted in attributing to light-weight conductors of relatively large diameter the tendency to vibrate under certain conditions of wind and conductor tension. The city's line crosses the San Joaquin Valley from east to west and it is therefore at right angles to the prevailing wind. Ordinarily, the amount of vibration can be practically eliminated and the possibility of conductor failure precluded by the use of weights applied to the conductor at the proper location adjacent to the insulator.

In this case, the use of two 10-lb. Stockbridge dampers was decided upon. These could be spaced 3 and 6 ft., respectively, on each side of the suspension string. As illustrated in Fig. 1, each damper consists of two 5-lb. weights joined by a short length of flexible cable, the center of which is clamped to the conductor so that the plane through the weight parallels the line.

Equipping 90 miles of two-circuit 110-kv. transmission line with these devices proved to be much easier than had been anticipated, because a careful study of the problem had been made before the work was begun. The line could not be taken out of service and, to meet this condition, the Safety Live Line Tool Company, of Oakland, Calif., was called upon to produce a tool for attaching the dampers which incorporated, besides the results of previous "hot" line experience, modifications suggested by engineers to meet the requirements of this particular job. The resulting tool is the ingenious device illustrated below, which enables the operator to measure, mark and attach the damper in a single tool operation.

It will be noticed that the cradle which carries the damper is supported by the upper stick through a joint which permits rotation. With the damper suspended from the tool below the wire, the stick is rotated until the arm contacts the conductor, when it commences to act as a crank so that further rotary motion of the stick raises the damper into position with its clamp surrounding the conductor. Then the second stick, one end of which is fitted with a socket wrench, is utilized to secure the clamping nut, and the operation is complete. The short cross stick is for measuring to secure the correct spacing of the dampers. It is 3 ft. long and at each end bears a large grease cup to which are screwed Alemite



"Hot-line" tool in operation. Top—Damper being raised to position. Center—Close-up of damper and tool. Lower—Completed installation. Note marking cups, at end of spacing stick, which release colored pigment when pressed against conductor

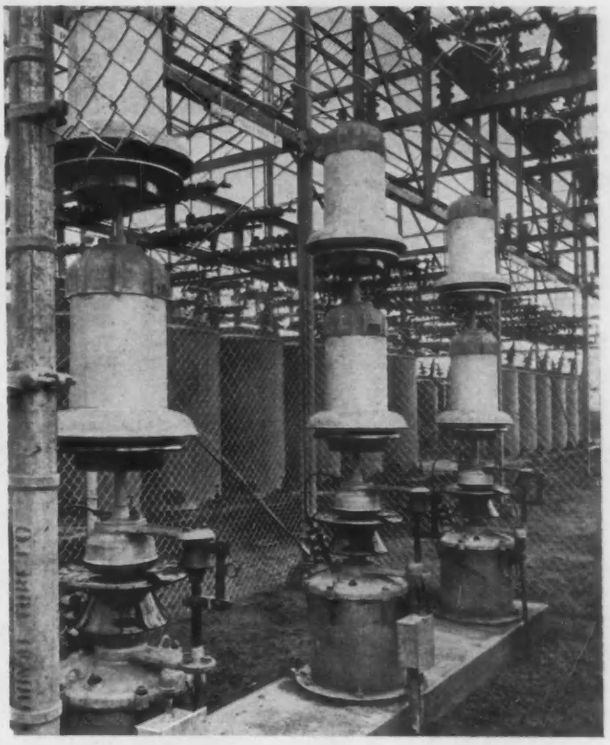
fittings so arranged that colored grease under pressure in the cup will be liberated by pressing the ball on the outer end of the fitting against the conductor. The operator places one end of the cross stick at the insulator and presses the outer end against the conductor, being rewarded with a clearly legible colored grease mark showing the proper damper position. The entire tool is suspended by a treated cotton rope from a gin pole clamped on the top of the tower. With one fitting it is possible to install the twelve units on one side of the tower by merely lowering or raising the tool to the conductor height. The gin pole is then moved to the other side of the tower and the process repeated. Modifications of the technique employed in applying the dampers to points of suspension have been perfected for applying the dampers to dead-end strings.

In this scheme of vibration elimination, 24 dampers are installed at each tower. Three men were able completely to equip five towers in a 7-hr. day with this device.

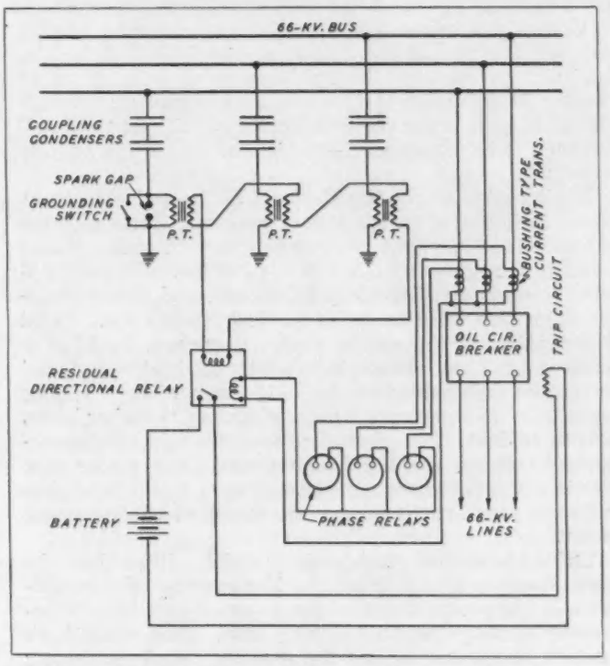
Coupling Condensers For Relay Operation

By E. R. STAUFFACHER
Relay Engineer, Southern California Edison Co. Ltd.

POSSIBLE use of coupling condensers to supply operating potential to protective relays is under investigation by the Southern California Edison Company, Ltd. At its Los Alamitos substation a trial installation of 66-kv. condenser coupling units has been made in conjunction with directional induction-type ground relays. Specifically, the equipment consists of three of the Ohio Insulator Company's 66-kv. coupling condensers installed to supply operating potential to a set of directional ground relays. These relays are exactly the same as those used for the protection of the 66-kv. lines at other stations utilizing potential transformers. However, at Los Alamitos substation the installation in question is a dummy set-up made as an experiment to obtain operating information that will show whether or not such equipment is feasible from an operating standpoint.



Installation of coupling condensers for relay operation at Los Alamitos substation. The potential transformers are mounted directly on the foundation with the two condenser units above. The grounding switch in each case is closed



Schematic diagram of connections incident to the use of coupling condensers to supply potential for directional relays

The three coupling condensers are expected to be more advantageous than the more expensive high-tension potential transformers, not only from the standpoint of saving in apparatus and installation cost, but also from the standpoint of the phase angle produced. This phase angle of the condensers in relation to the phase angle of the fault current offers a possible solution to the problem of securing reliable and correct relay operations without the necessity of compensating the relay circuits, as apparently is necessary when potential transformers are used. The small amount of oil and the elimination of high-tension bushings, reduces the hazard of the equipment.

The installation in question consists of three units, each comprising a stack of two condenser units and one small potential transformer. Each of the condenser units is made up of an outer metal cylinder with a porcelain dome inside of it. This dome is copper plated on its inner surface, thus providing the second electrode of the condenser. The mounting pin between units serves as the electrical connection which places the condenser units in series between line wire and ground. The equipment is rated at 80-volt-amp., which is expected to be sufficient for the operation of the standard directional induction-type ground relays.

As far as is known, this is the first application where coupling capacitor units have been used for the operation of protective relays. However, the same type of installation has been in successful service for some time in various places for synchronizing.

From an installed cost standpoint, the capacitor equipment represents a net saving of some 40 per cent over the usual high-tension potential transformer equipment.

Smaller foundations are required and the actual installation is simpler. At the Los Alamitos installation the special resistor unit originally specified to be placed between the equipment and the high-tension line is not in service. It was deemed to be unnecessary.

While the installation at Los Alamitos is of an experimental nature, sufficient faith is placed in the equipment that it is arranged so that at any time it may be cut into service to control the 66-kv. oil circuit breakers at that station. In the meantime, operation indicators have been connected in the trip circuits of the relays which, in connection with indicating lights and alarm signals, provide a means of recording and watching the operating of the equipment during the initial experimental period.

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Reactive Kva. Metering----IX

Two-Element Three-Phase Meters Do Not Give Accurate Results on Four-Wire Circuits Under Normal Conditions

By E. C. GOODALE
Tacoma, Washington

IN SOME instances it may seem desirable to use two-element meters in place of three-element meters on three-phase four-wire circuits. It may be mentioned here, however, that a two-element meter will not correctly register the power used on a four-wire circuit, primarily because it does not comply with Blondel's Theorem. According to this theorem three meters or meter elements are necessary in metering any four-wire circuit, except in the special case of balanced conditions. Consequently, unless the line-to-neutral voltages are balanced, a two-element meter will not register correctly on a four-wire circuit.

This latter statement may be modified to some extent by saying that for the special case in which the vector sum of the line-to-neutral voltages is equal to zero, the two-element meter will register correctly on a three-phase four-wire circuit. The reason for this is that two of the line-to-neutral voltages react in the meter elements with two of the line currents, registering them correctly. The third line current, however, flows in a backward direction through both of the elements, hence working in a negative direction with the two line-to-neutral voltages on these elements. Now, if the vector sum of the three line-to-neutral voltages is equal to zero, then any one of them is equal to the reverse of the vector sum of the other two. Hence the third current (C in this case, Fig. 32), working in a reverse direction with respect to the other two voltages has the effect of working in a positive direction with respect to its own voltage (C in this case).

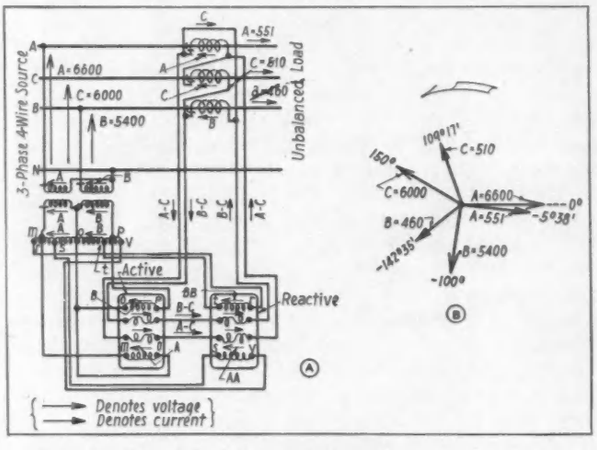

Fig. 32—Metering unbalanced three-phase four-wire circuits with two-element meters. This method is not recommended as it gives rise to large errors

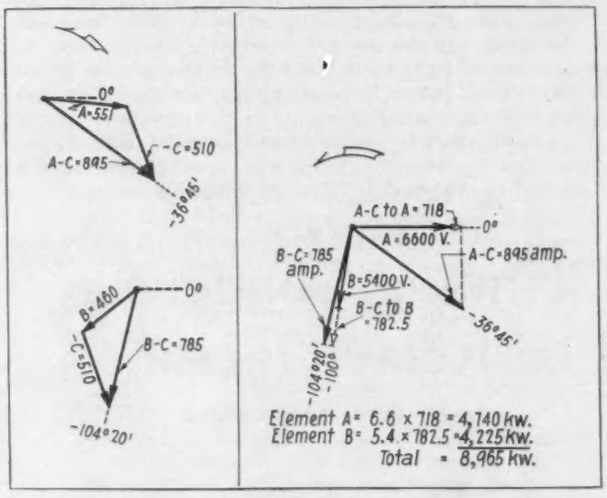

Fig. 33, left, and Fig. 34, right—Showing value and phase position of currents flowing through meter elements and the combination for effective registration on the power measuring meter

Fig. 32 illustrates the use of two-element power and reactive meters on a badly unbalanced three-phase four-wire circuit. This is the same circuit as the one discussed in the previous case of four-wire metering. Thus, the results of two-element versus three-element metering may be compared. Assumed vector relations of the line-to-neutral voltages and line currents also are shown.

Values and phase positions of the currents flowing through the meters are determined as indicated in Fig. 33. Current passing through element A is made up of the vector difference A-C, whereas that passing through the element B is the vector difference B-C. Current A-C is found to be 895 amp. at –36° 45′ and B-C is 785 amp. at –104° 20′.

Registration on the two elements of the active (power) meter is indicated in Fig. 34. Current A-C has a power component of 718 amp. with respect to voltage A. Hence element A registers $6.6 \times 718 = 4{,}740$ kw. Current B-C with respect to voltage B is 782.5 amp. and power registered by this element is $5.4 \times 782.5 = 4{,}225$ kw. Total registration of the active meter, therefore, is $4{,}740 + 4{,}225 = 8{,}965$ kw. True kw. taken by the load were found in the preceding article to be 7,773 kw., which reveals an error of + 15.1 per cent, which, of course, is rather large.

It is evident, then, that for cases wherein the line-to-neutral voltages are not balanced and their vector sum also is not equal to zero, the two-element meter furnishes rather a poor substitute for the standard three-element meter.

There are several combinations which will produce the same result as that of Fig. 32. For instance, the secondaries of the potential transformers could have been "commoned" on the right side of both coils. This would have made it impossible to use the phasing auto-transformer for the reactive meter, as connected in Fig. 32, but would have allowed the "commoning" of the load side of the

voltage elements, the registration being the same as for Fig. 32.

Or, the elements could have been tied together as shown, the center tap coming down to the load side of the voltage coils and the outside leads to the line sides of the coils. This would have put reverse voltage on element B and consequently its current then would have to be run through in the reverse direction, C-B being used in place of B-C. Sometimes the jumper lead from current transformer A to current transformer B (which passes current C and closes the delta of the current transformers), is placed at the meter instead of at the current transformers, making the connection rather confusing.

Another variation of this connection which produces the same result is to have two additional current coils wound in the meter in a reverse direction, one in each of the two elements. Current from current transformer A passes through current coil A, B through current coil B, and C passes in series through both of the additional current coils, giving a reverse reaction as it passes through. This latter is identical to the action in Fig. 32 in which are used standard two-element meters of the same type as used in three-phase three-wire metering.

If the line-to-neutral voltages were balanced the auto-transformer connection feeding the reactive meter voltage coils would function perfectly and the voltages applied to the reactive meter would lag those applied to the active meter by 90 deg.

Determination of the numerical value and phase position of the voltages applied to the reactive meter from the "secondary" side of the auto-transformer, regardless of the balance of the voltages applied to its "primary," may be followed in Fig. 35.

Phasing auto-transformers are tied together at the center as indicated, each having taps at 57.7 per cent, 100 per cent and 115.4 per cent of normal full winding as measured from the center. That is, s and t represent

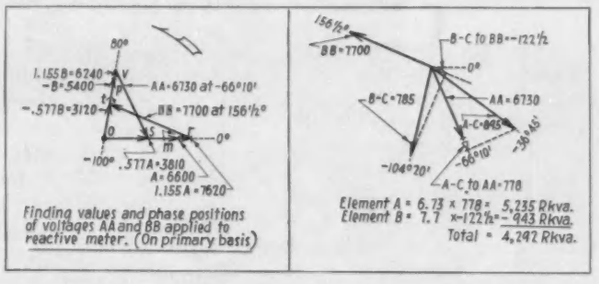

Fig. 35, left—Relation of value and phase position of reactive meter voltages on secondary of auto-transformer. Fig. 36, right—Combination of voltages and currents for registration in the reactive kva. meter

the 57.7 per cent points, m and p the 100 per cent points, and r and v the 115.4 per cent points.

If we lay off the vectors of the voltages A and B applied to these auto-transformers at their 0 per cent and 100 per cent points, that is A = 6,600 volts at 0 deg. and -B = 5,400 volts at 80 deg. (all in terms of primary voltage) and in line with them lay off their 57.7 per cent and 115.4 per cent values, we will have the data necessary for determining the voltages AA and BB applied to the reactive meter. Voltage AA, considered as an induced voltage or voltage drop within the meter coil from point v to point s, is equal to the vector sum of 115.4 per cent of voltage B + 57.7 per cent of voltage A. (See Fig. 35.) This is found to be 6,730 volts at -66° 10'. Similarly voltage BB, from point r to point t, is equal to -115.4 per cent of voltage A -57.7 per cent of voltage B. This results in 7,700 volts at 156.5 deg.

Having found the numerical values and phase positions of voltages AA and BB, it is easy to determine the registration of the elements of the reactive meter. (See Fig. 36.) Element A will register the product of voltage AA (6,730) multiplied by the power component of current A-C with respect to voltage AA. This is found to be 778 amp. Hence the registration of element A will be 6.730 × 778 = 5,235 Rkva.

With respect to voltage BB the power component of current B-C is -122.5 amp. because current A-C is more than 90 deg. out of phase with voltage BB. Consequently there will be a negative registration on B element amounting to 7.700 × -122.5 = -943 Rkva. The true Rkva. of the load was 4,020, as determined in the previous article. The net registration on the reactive meter is 5,235 -943 or 4,292 Rkva. This represents 106.8 per cent registration, or an error of + 6.8 per cent as against + 7.5 per cent with the three-element reactive meter described in the previous article.

It is evident, then, that in so far as reactive metering is concerned it makes little difference whether two- or three-element meters are used. The one is hardly more correct than the other and in the particular example assumed the two-element was slightly more correct.

With active (power) metering, however, it does make a very marked difference which is used, the three-element metering being correct under all conditions whereas the two-element meter requires that the line-to-neutral voltages have their vector sum equal to zero. This condition rarely is obtainable, but probably is most nearly reached when the metering is done in a substation, where the potential transformers are energized from the four-wire secondary of a delta-star power bank. Under these conditions, the vector sum of the line-to-neutral voltages will be equal to the product of impedance Z multiplied by current D, where Z is the impedance (in ohms) of one transformer (assuming all three are alike) and D is the residual of neutral current (of unbalance) of the load. It is this residual voltage which throws the two-element meter in error. This residual voltage, of course, becomes greater as the distance from the delta-star transformer bank increases, because of the impedance drop in the line. At the transformer only the drop in the transformer caused by the residual current is encountered. Hence the error at that point naturally should be least.

By "substation" is meant, of course, any delta-star transformer bank, whether transmission or distribution. The higher the impedance of the tranformer bank and the greater the amount of residual current flowing, the greater will be the error introduced, whether at near or far points.

Thus it would seem as if the two-element meter, when applied to four-wire three-phase circuits, should be used only for substation data purposes. The three-element meter should be used for billing the customer.

EDITORS NOTE: This concludes Mr. Goodale's series of discussions pertaining to the metering of reactive kva.

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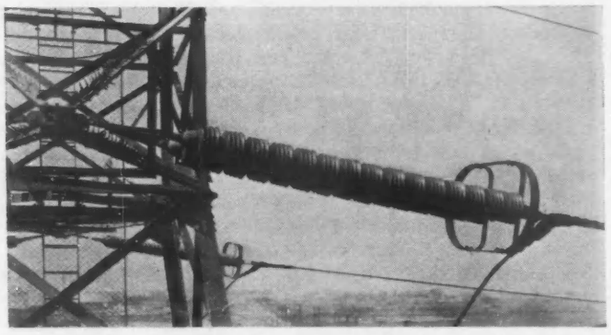
Heaters Keep Motors Dry

Accumulation of moisture is prevented in idle motors which must stand in damp places for prolonged periods of time by a new metal-clad strip type industrial heating unit which is placed between the motor frame and the bedplate. A canvas is then placed over the motor to retain the heat. If a separate circuit is not run for the heater, the motor circuit is utilized by disconnecting two terminals of the motor. The cost of the heater is nominal and the current consumed is negligible as compared with motor repairs, the units consuming 500 watts at 220 volts. Little fire hazard is involved, since the motors are usually outdoors.

Survey Endorses Use Of Fog-Type Insulators

ADVANTAGES derived from the use of "fog-type" insulators are outlined in a recent survey* of actual operating experience on a 220-kv. system. The Southern California Edison Co. Ltd. was selected as a typical system from which to secure the data as some of its 220-kv. circuits are located within the zone where salt spray and fog conditions might be a source of trouble. Furthermore, in the last few years the company itself had been investigating the possibility of reducing insulator cleaning costs without lowering the operating efficiency of the lines through increased flashovers. The investigation was carried out under the direction of R. J. C. Wood**, research engineer for the company.

To secure actual operating conditions, a test rack was constructed at a location on the ocean front which was particularly subject to the worst conditions of spray and fog and where considerable transmission trouble had been experienced previously. At this place the nightly condensation on the insulators was often sufficient to cause noticeable dripping, and investigation proved that, aside from the salt deposits, soot and dust were present in considerable quantities. Thirteen different designs of in-



Typical "fog-type" dead-end string for 220-kv. circuit

sulators were subjected to a 2½-year test on a potential of 150 kv. to ground and each flashover was carefully analyzed with reference to the atmospheric conditions and related factors. These observations showed the minimum value of surface leakage resistance required to withstand arc-over in 150-kv. service under local salt spray and fog conditions. With this data at hand, it became a simple matter to satisfy the ordinary line requirements as to the number of units per string and then choose the type which afforded the necessary resistance at a minimum of cost for insulators and supporting structure.

As a result of the tests the 6-mile ocean-front stretch of the 220-kv. Lighthipe-Long Beach line was equipped with fog-type insulators of the chosen type in 1928, and an additional 11-mi. extension of the 220-kv. line from Lighthipe to La Fresa was similarly equipped in 1930. The two sections are very nearly identical. Each has two three-phase circuits carried on four-legged steel towers 94 ft. high to the lower crossarm and 114 ft. high to the third or top arm. These towers are spaced six to the mile and provide a phase spacing of 20 to 22 ft. Grounding is secured by setting all four legs 7 ft. below grade. There are fifteen fog-type insulators per string or 90 per tower, normally, although some of the dead-end towers have as many as 360 insulators. All strings are equipped with arcing horns and static shields.

The Long Beach section, carrying a maximum load of 200,000 kva., has a 1⅛-in. conductor consisting of 42 strands of copper and 19 strands of bronze. The La Fresa section, on which the load varies from 30,000 to 50,000 kva., uses a steel-cored aluminum conductor with a net area of 666,600 circ.mils.

The 17-mi. length of 220-kv. line that is now equipped with fog-type insulators has a total of about 10,000 units. The same installation, if made with ordinary suspension insulators, would involve an expenditure of $2,400 annually for cleaning alone—complete manual scouring of every insulator with steel wool three times a year. This has been the company's average cleaning experience on ordinary suspension units used elsewhere under comparable conditions.

Fog-type insulators, on the contrary, have required only one cleaning per year so far; they show good indication of being able to go two years between cleanings hereafter and are being worked on that basis right now. Even with the one-year cleaning schedule used to date, the expense is one-third of that commonly experienced—$800 a year instead of $2,400.

Savings of $1,600 per year in maintenance expense on this 6-mi. stretch of transmission circuit, together with the operation of the line for 2½ years without flashovers, justifies both the tests made and the final selection of fog-type insulators, in the opinion of the Edison engineers.

* Nielsen Survey No. LP-50-JZ on Lapp insulators.
** Author of paper on this subject presented before the Pacific Coast convention of the A.I.E.E. at Santa Monica in September, 1929.

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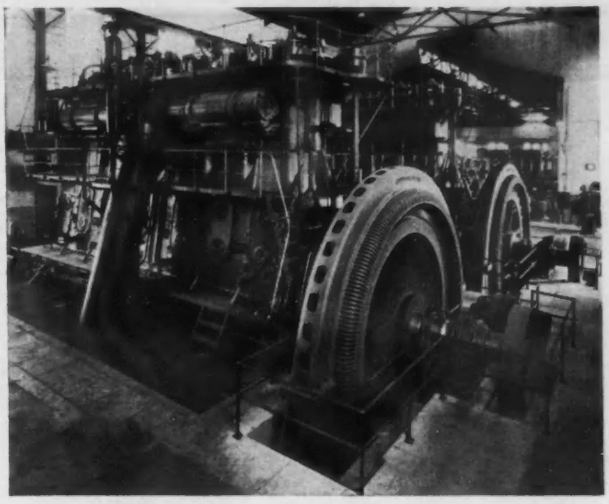
Tucson Utilizes Diesel Electric Power

CAREFUL consideration of the economic factors pertaining to the production of electric energy in Tucson, Ariz., has led to the use of diesel-electric generating units for supplying power to this locality. Growth in generating facilities naturally parallels the increase in population, now approximately 32,000—the largest single locality in the West to be served exclusively with diesel-electric power. The normal rate of increase in population to this figure required increased amounts of electric energy but in quantities which were well within the economic capacities of diesel prime movers. This situation is gradually changing. Continuing with the same percentage increase in population as has been enjoyed during the last decade, numerical growth will be much larger than before and these load conditions may make it an economic necessity in the near future to supply the increased demand with steam turbine units.

The Tucson Gas, Electric Light & Power Company

Power house of the Tucson Gas, Electric Light & Power Company at Tucson, Ariz. A spray pool for cooling the circulating water is shown on the right



Two of the 3750-kva. diesel-driven alternators in the Tucson plant. The remaining units can be seen in the background. Note the short center drive for the individual exciters and the protective railing enclosing each machine

now has installed in its plant eight diesel engines driving generators of an aggregate capacity of 11,100 kva. These units vary in size from two 124-r.p.m. Busch Sulzer engines driving Allis-Chalmers generators rated at 3,750 kva., to two 150-r.p.m. Fulton engines driving 375-kva. Westinghouse generators. Intermediate sizes consist of two Westinghouse generators of 500-kva. capacity and two others of 925-kva. capacity driven by Busch-Sulzer and Werkspoor engines, respectively. Kilowatt-hour output of this plant has increased the 1919 figure of 5,560,000 to 29,000,000 in 1930, the present daily output being 80,000 kw.-hr. on an 80 per cent load factor.

Nine hundred gallons of cooling water are pumped every minute from wells near the building, the cooling water being aerated in a spray pool as shown in the accompanying photograph. The circulating system requires the use of three 900-gal. pumps which keep a 30-lb. pressure at all times. Provision is made for an audible signal which automatically warns the operator when pressure falls below 20 lb. Water replacement is subject to weather conditions and ranges from 30,000 to 40,000 gal. per day. Injected air compressed to 1,000 lb. is cleansed by passing through two wash filters before entering the engines.

Diesel installations, generally located near their load centers, are confronted with the problem of air vibration because of their exhaust. This annoyance to near-by residents has been eliminated by this company by using Maxim sound wave filters on the two largest units and underground pipe mufflers on the remaining six units.

The change from steam to diesel power involved a comparison between high-price coal, which must be obtained from Colorado, and relatively low-price engine fuel oil. The lack of an adequate water supply was also a contributing factor to determining the change. The flexibility obtained from the use of a number of various rated units offers the further advantage of adapting the plant's capacity more exactly to the demand on the system, and facilitating plant expansion when required.

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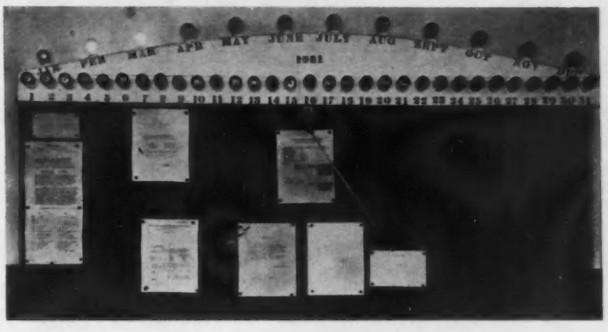
Illuminated Score Board Fosters Safety Interest



THIS novel illuminating device for recording accidents that occur in the distribution department of the El Paso Electric Co., El Paso, Texas, was designed by men in the department for installation above the bulletin board, and embraces several features that lend it considerable interest.

A row of twelve lights placed along the upper border provides a light for each of the twelve months in the year. For the months of completed operation in which no accidents occur the light is clear; red lights are used to designate the months in which there were accidents.

Below the globes indicating the different months, a row of 31 lights has been placed, one for every day in the month. For days when there are no accidents these lights are green, but days on which an accident occurs are designated by a red light. The red lights, by means of thermostatic control, are made to flash on and off, while the green lights burn steadily.

New Books

ELECTRICAL ENGINEERING, by Clarence V. Christie, Head of Department of Electrical Engineering, McGill University. Cloth bound; 6 x 9 in.; 656 pages; 571 illustrations. Fourth edition. Published 1931 by McGraw- Hill Book Co., Inc., New York. Price $5. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco.—A textbook for upper division students, discussing theory and characteristics of electrical circuits and machinery, the publication has been revised to contain an outline of mathematical relations required for the solution of problems in alternating current theory, the design of a commutating pole d.c. generator, a discussion of the problems of system stability, and a set of typical problems in electrical engineering. Readily assimilable material with new flavor.

UNDERGROUND SYSTEMS REFERENCE BOOK, by the Underground Systems Committee of the Engineering National Section, National Electric Light Association. Cloth bound; 8½ x 11½ in.; 377 pages; illustrated. Published 1931 by National Electric Light Association, 420 Lexington Ave., New York. Price $4 to members of the association; $6 to non-members. This publication is of unusual interest to the public utility executive, engineer, construction or operating superintendent, foreman and supervisor. It has been compiled by a staff of well informed engineers, presents valuable data of accepted practices, and has been prepared for the man in the field as well as the man in the office.

The introduction contains a non-technical, historical review of the development of underground systems, and it is interesting to note that their installation dates back to 1812. Also included is a brief general survey of modern underground practices and a discussion of the application of cables.

Other chapters are on such subjects as cable and cable insulation, conduit and manholes, cable installation, cable splices and terminals, cable operation, miscellaneous equipment for underground installations, and safety practices. There is an appendix of general information and a complete bibliography of the literature on cables and underground practices published throughout the world. These references have been classified and indexed for convenient use. For the first time authoritative data and information on planning, constructing and operating underground systems, based on successful methods and practices of operating companies, have been published in convenient reference book form.

NON-INTERPOLATING LOGARITHMS, COLOGARITHMS, AND ANTILOGARITHMS, by Frederick W. Johnson, Instructor in Chemistry, University of California. Fabricoid bound; 6 x 8 in.; published 1930 by The Simplified Series Publishing Co., San Francisco. Price $2.25.—This book furnishes a set of tables of logarithms, cologrithms and anti-logarithms that will, for ordinary calculations, entirely obviate the necessity for interpolation or use of tables of proportional parts. It contains simple, yet somewhat more accurate tables to five places; the use of the tables is easily grasped. The book is especially valuable as an aid to the advanced student of mathematics.

Centralized Control For Aggregate Plant

Electric Operation of Modern Sand and Gravel Plant of the Kaiser Paving Co. Raises Operating Efficiency Through Reducing Starting Time and Labor Costs

By L. F. LEUREY
Consulting Electrical Engineer, San Francisco

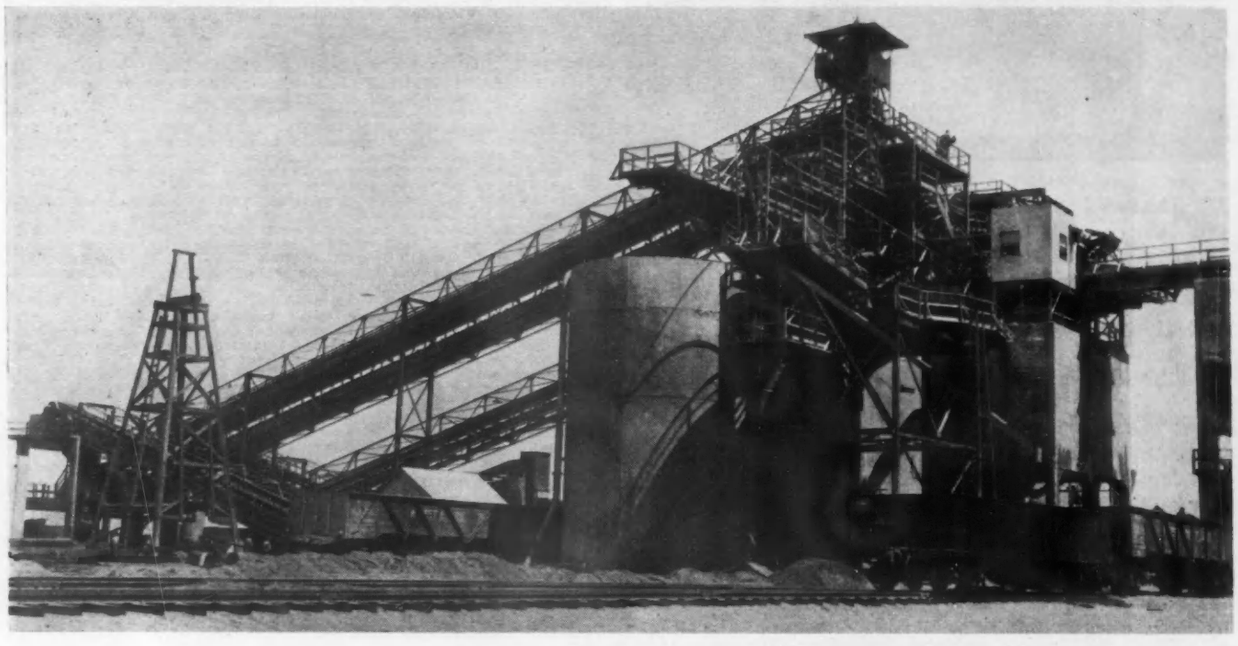
TWO men, stationed at the electrical nerve centers, control the production operations of the large, modern aggregate plant recently completed by the Kaiser Paving Co., near Pleasanton, Calif. Served by rail connections with the Western Pacific and Southern Pacific railroads, embodying the most advanced design and utilizing electric drive for its equipment, this plant produces sand and gravel capable of meeting the most exacting requirements of engineering specifications.

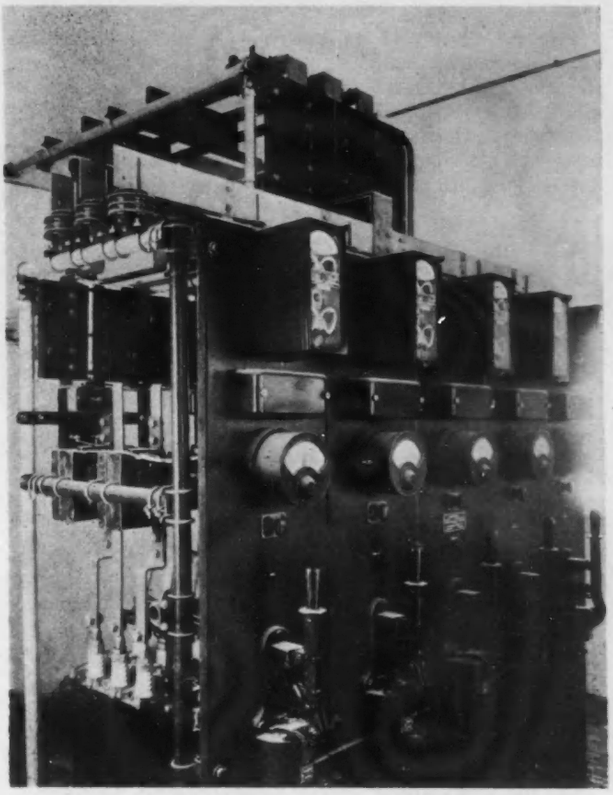
Raw material, in abundant supply, is surfaced-mined by an electric shovel and delivered to the receiving hopper of the plant in twenty-yard dump cars hauled by twelve-ton diesel locomotives. From the hopper the material is conveyed on a 36-in. belt to a screen which rejects sizes over 4 in., the latter going on to a crusher, the crushed material then being combined with the original mass and conveyed in another series of conveyors to the top of the plant where washing and classifying continues. Classifying is accomplished in a series of scalpers and vibrating screens which segregate the gravel into six classes ranging from 2½ in. to ¼ in. in size, delivering each class to the proper storage bin. Material finer than ¼ in. is sluiced with the cleaning water from the previous operations into a sand plant consisting of two Dorrco classifiers, a sand washer and bowl classifier, which clean, de-water and deliver the sand to two bins for storage or shipment.

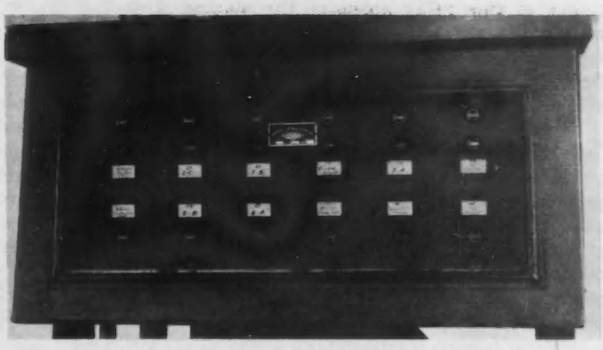
Gravel storage bins are 24 ft. inside diameter and 60 ft. in height, 20 ft. being below the ground. Above the ground level a gate and chute in each bin permit discharge into cars for stock piling. Under the bins two transverse conveyors, receiving gravel from the electrically controlled gates in the bottom of the bins, discharge on a central conveyor which raises the material to the top of the plant for distribution to six smaller surge or shipping bins corresponding to the gravel size in the circular bins. From these shipping bins material is discharged to a 48-in. belt conveyor which runs at right angles to the loading track and discharges into cars for shipment. All material is given a final washing and screening before shipping to eliminate breakage or "fines" and maintain the highest possible standard of product.

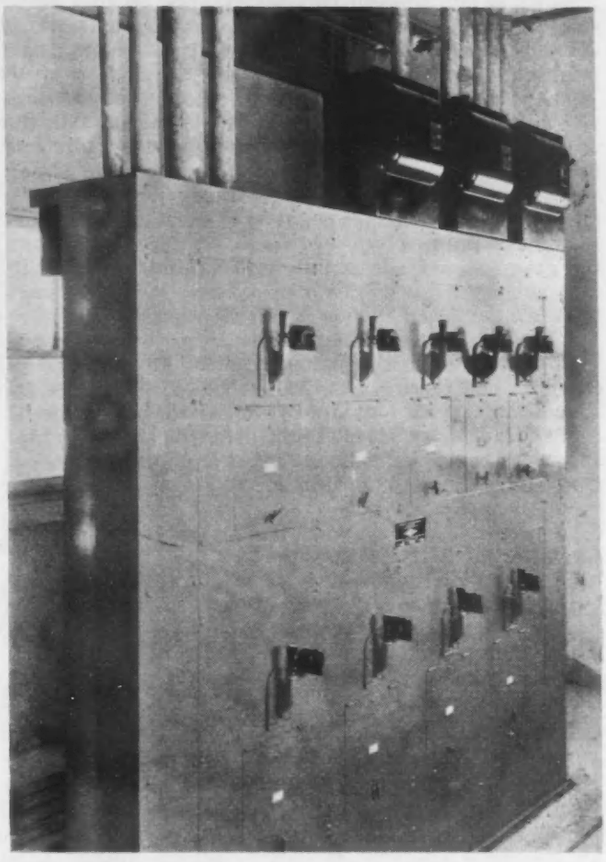
From the foregoing discussion it is evident that the conveyor system is an important part of the plant operation. Failure of any portion of the main system would result in a shutdown until material could be obtained or until the pile-up, resulting from continued operation of preceding conveyors, is cleared away. The possibility of this situation occurring is precluded by the design of the plant and the electrical installation. Production is divided into two parts, one consisting of feeding the raw material from the pit, washing and classifying it and delivering it to the storage bins; and the other the handling of the products from the storage bins to the shipping conveyor. Conveyors are of the open type so that an operator at the top of the plant is afforded an excellent view of all belts and machinery. At this point the control station for the first half of the operation is located.

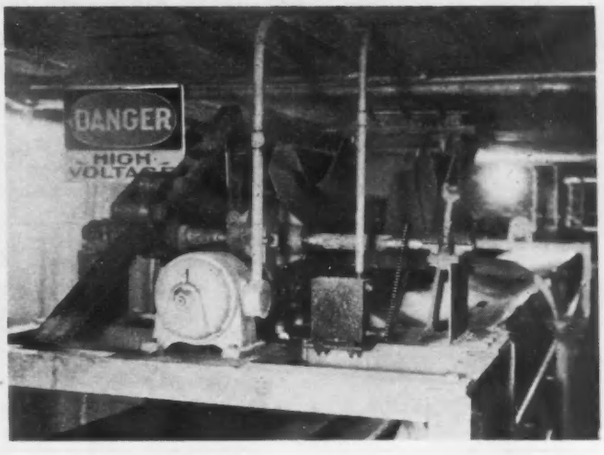
This control station consists of twelve "start" and











Facing page—Kaiser Paving Co.'s aggregate plant. One operator, in the house at the top of the structure, supervises and controls conveying and production machinery. A second operator regulates mixing and loading apparatus from another location

Above—Main switchboard serving five distribution and control panels near centers of motor concentration

Top right—Push-button station controlling half of plant operations. Main conveyors have individual control, but are interlocked with the single push button governing 21 motors on transfer conveyors and process equipment

Center right—Distribution panel. Bus and disconnecting switches are enclosed in a sheet metal housing; magnetic switches are mounted on the exterior of back panel. Local or remote operation is provided by the small switches adjacent to each disconnect

Lower right—Remote controlled gate at each storage bin base. The geared interlock automatically stops the motor after it has been energized by the operator

"stop" push buttons assembled in a single housing. The elevating conveyors, on account of importance and size of motors, are individually started from control buttons. Washing and classifying machinery and the short transfer conveyors all perform a coordinated service. Advantage was therefore taken of the small motor sizes involved to start this entire group of machinery from a single push button. This push button energizes the operating coil of a multi-finger relay, the fingers of which close in sequence with adjustable time interval. Each

finger of this relay actuates the closing circuit of three or more magnetic motor starters. The number of motors controlled depends upon the individual sizes, the aim being to limit the starting current to the equivalent current taken by a single 30-hp. motor.

The time interval of closing between each finger requires proper adjustment to produce even increments of starting current, but where small motors are involved the acceleration is rapid and the over-all time of starting is small. All motors in the washer and classifier group are of class 2 high starting torque type, directly connected by speed changers to their loads. A careful check of the power input to the main busbar showed that the instantaneous demands of the large motor group did not transgress the power company rules nor adversely affect the demand feature of the rate schedule. While no fixed rule can be laid down, it will usually work out that group starting can be practiced where the total group starting current does not exceed that of the largest single motor permitted by power company rules.

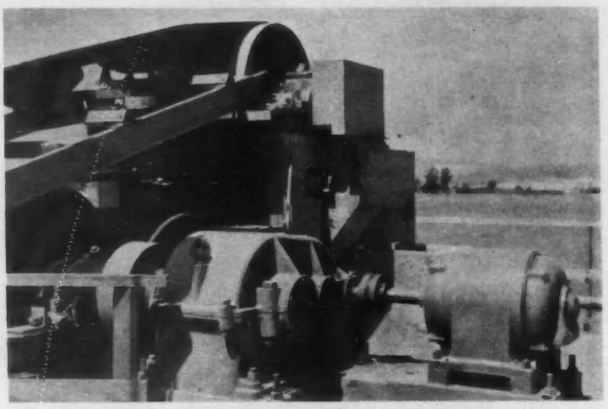
The problem of concentrated control and rapid starting was not the only one encountered in connection with the needs of this plant. The 21 motors that constitute this installation are so coordinated that the stoppage of any single motor interrupts the entire train of operations. To meet this condition the magnetic starters of all motors in the group are interlocked for sequenced starting and the group as a whole is interlocked through the multicontact relay with the raw material conveyors, which are in turn interlocked with each other.

With such a complicated relationship it was essential that some quick method of segregating troubles and of carrying out routine tests be embodied in the design. This flexibility was obtained by the installation of special control transfer switches at each magnetic starter so that any motor could be quickly switched from the interlocked train and converted to local push-button control. The control was further connected so that each motor was fully protected against low voltage and overload when operating in the "local" position.

For handling the product from storage to shipping bins six gate motors operating discharge gates in the storage bins and four conveyor motors are connected to the second master control station on top of the shipping bins. The motors are interlocked and equipped with control transfer switches in a manner similar to that of the former station.

For detached and intermittent operations, such as crushing and returning of "oversize," sump pumps, etc., the control is either by hand compensators for the large motors or local push-button control for the small ones.

Five switchboards furnish energy to the various motors in the plant. These switchboards are built of stretcher leveled steel, the disconnecting switches being mounted

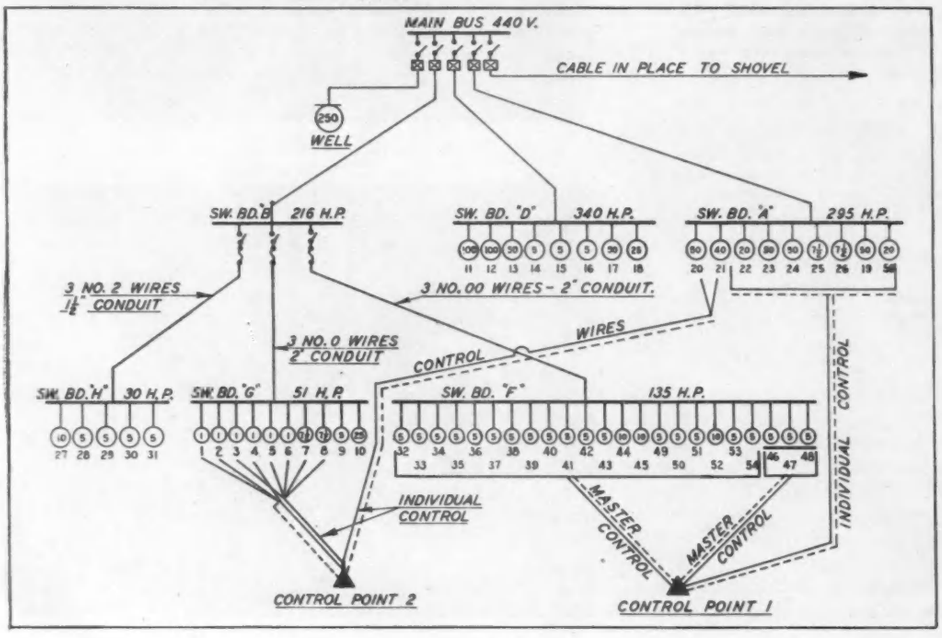


Motors driving conveyors and other machinery are mounted in the open with practically no resultant trouble

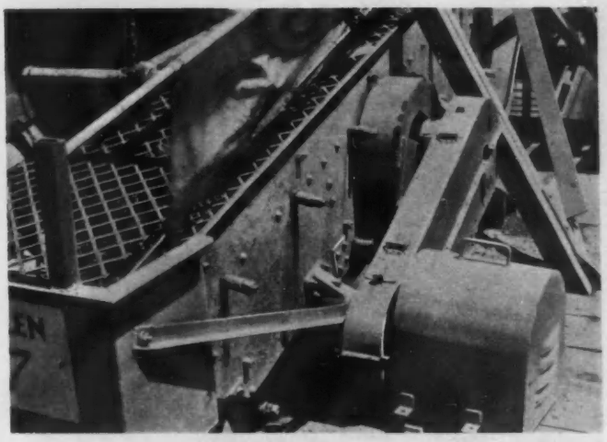
in enclosed pockets with external handles and the magnetic starters in corresponding position to the rear of the board.

The disconnecting switches were equipped with auxiliary fingers connected in the control circuits to prevent feedback of energy. Switchboards are located approximately at the mass centers of the various motor groups and permit of compact grouping of motor starters, which is of great importance for routine maintenance and when locating trouble.

All control wire was No. 14 single conductor wire ganged in a common conduit from the switchboards to the master control stations. All control wires are operated at 440 volts, the natural voltage of the motors, and the wires terminated in fanning strips to assist in tracing.



Diagrammatic layout of feeders and distribution panels. The 42 motors on switchboards "A," "F" and "G" are controlled from two stations. Dotted lines indicate interlocking control circuits and figures within the circles indicate motor horsepower



In locations where washing operations might splash water on the motor, a sheet metal protection is provided

As previously mentioned, the entire plant is of the open type. Conveyor motors operate out of doors with no protection. In the case of screens and classifiers, where water is liable to be splashed on the motor, the latter is protected with a sheet metal housing as shown.

Water, in the large amounts necessary for washing the raw material, is supplied by a well on the property through a 2,000-g.p.m: pump driven by a 250-hp. vertical motor.

Operating results realized through the use of out-of-door motor installation with starting equipment incorporated in strategically located distribution boards in conjunction with the concentrated control system are a reduction in first cost for the electrical installation and a reduction in operating personnel. With the concentrated control system in operation, no motors are started at the beginning of a shift until a few minutes before the whistle blows, and the plant is then in full production immediately. Elimination of expenditure of working time necessary to start the plant from isolated stations and of energy waste during idle operating periods results in a direct monentary saving under this system. The complete interlocking system existing between all motors operating in a conveyor train has resulted in the absence of jams and costly pile-ups. Centralizing of starting equipment also results in a minimum of maintenance.

It is believed that this system can be installed to advantage in many industrial plants having similar characteristics. With adequate signaling systems and proper guarding of machinery it is no longer necessary for the operator to see the equipment which is being started and the savings enumerated above may be made available where this system, or a modification of it, can be applied to an industrial process.

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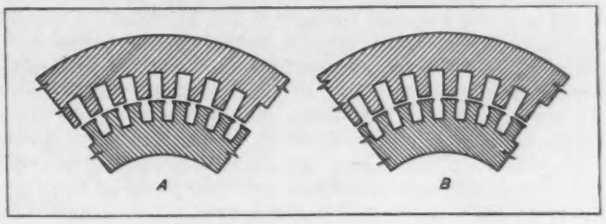
Dead Points in Old Rotors

By W. O. Hurlbut

When modernizing the control equipment of some old wound-rotor induction motors equipped with slip rings and external starting resistance, dead points often develop at the start if the resistance is removed. When this happens, the repair man usually breaks the resistance, short circuits the rotor winding terminals, or installs modern equipment to control the primary starting current, only to discover that the rotors develop no torque in such positions and must be tipped over with a bar when starting. Often, the trouble seems to lie in the ratio of the number of rotor slots to the stator slots and the resulting necessary symmetry of the pole phase groupings in the windings. This ratio has much to do with the leakage flux at starting, especially when the rotor or secondary winding resistance is low. If the secondary resistance is low, then the rotor current can acquire a high value at a very low voltage and but little magnetic flux is required to induce this position.

As the leakage pass is largely across the iron in the key of the rotor core about the coils, the position of the key in relation to those of the stator, variable of course when the rotor is in different positions, is an important factor; that is, the reluctance of the leakage pass is varied according to the relative positions of the stator or rotor key.

The sketch shows a rather exaggerated condition in which the ratio of the number of slots in the rotor to those in the stator is 1 to 1. The frequency of the magnetic flux in the rotor will be considered equal to that in the stator as only the instant of start without mechanical



Sketch illustrating conditions of leakage flux

rotation will be discussed. In the position indicated as A, the leakage flux would be maximum so far as relative position of key is concerned; at position B, the leakage flux would be minimum.

At B, which would be a dead point in all or most of the pole groups in one phase aligned likewise, the percentage of flux traversing the leakage pass would depend largely on the resistance of the secondary circuit, so that if resistance is inserted in the circuit at starting, this secondary current which opposes the flux is reduced. Thus the leakage flux lessens, the density of the entire magnetic circuit becomes higher, the force consequently becomes greater, and the primary current reduces the cause of the increased counter emf. As the rotor revolves, the frequency in the secondary winding lessens and conditions are altered.

In seeking a remedy without inserting resistance in the secondary circuit (which would increase the slipping and therefore is not desirable) it is found that the dead points can be eliminated by distributing the action of the secondary coils; that is, by eliminating the groups which make up the phase poles and allowing each coil to act as an individual unit independent of all other coils.

One successful method of doing this is to bolt or otherwise mount a heavy copper ring as a conductor on the connection side of the rotor winding so that all of the coils are short circuited on themselves. This produces an effect similar to a squirrel-cage winding though the ring is only on one side of the winding.

Methods of mounting the ring may depend upon the thickness of the clips and other mechanical considerations. In one case, when the clips on the coil end were narrow and deep, two rings were used, one at the top and one at the bottom of the clip, so that small bolts could be drawn up between the clips and clamped rigidly between the rings, thereby providing a secure contact on the top as well as on the bottom.

A Watt of Prevention . . . .

By E. J. CIPPERLY
Industrial Heating Specialist, General Electric Co., Los Angeles

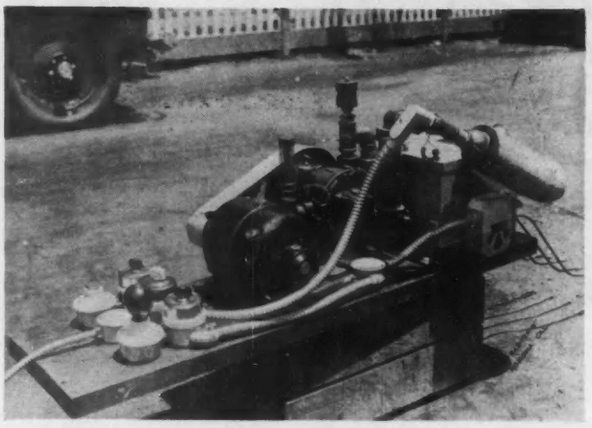
FROM the earliest days of the citrus fruit industry, the problem of preventing loss through blue-mold decay has been recognized as of vital importance, and for the past twenty years or so the best known experts in the marketing and handling of citrus fruits have been trying to solve it. As all fruit men know, however, no adequate remedy for blue-mold decay was discovered until recently, when the borax method of treatment became available to the industry. One of the secrets of this process is electrical temperature regulation.

When the fruit is delivered to the packing house, it is sterilized as a precaution against decay. As the fruit passes through the washer, a mild solution of borax thoroughly sterilizes and cleanses each piece, thus effectively preventing the development of mold, even in those fruits that have been positively injured and inoculated with blue-mold spores. After thus being cleaned, it is dried and then passed through a fog chamber in which the fruit has its pores invisibly sealed by a harmless fog of paraffin. It is in this machine that electric heat and regulation are used. This paraffin coating, which seals the fruit, does so only to about 90 per cent of its surface so that "breathing" is allowed. This treatment prevents the fruit from aging and shrinking, keeps it plump and firm, cuts down icing costs and enables the shipper or buyer to keep the fruit in fresh condition. When the fruit leaves the fog chamber, which consists of a large box-like compartment fed by conveyors, it is then polished with special brushes at a temperature of 200 deg. F. so that its natural sheen and attractive color are enhanced and maintained.

Refrigeration of the fruit when shipped to the market is unnecessary if this method of preservation is used. One manager of an exchange states that no fruit has been shipped under ice for the seven years his plant has used the process, except 30 cars released during an unusually wet period. Later it was found that ice, even under these conditions, was unnecessary. Another packer claims a saving of $25,000 to $30,000 above the cost of the system by not using ice. Some 1,200 fruit cars have been released un-iced.

In California alone, approximately 500 fruit packing plants, including 225 devoted to citrus fruit, will eventually be equipped with a waxing system, for the treatment aids deciduous fruits also. Plants now equipped represent

Typical installation of a Brogdexing machine with the fog unit mounted on top. The foggers spray wax on the fruit. Control thermometer is in the center of the machine



Close-up of the fogging unit. The bayonet-like tubes to the right emit the wax. Two immersion heaters control the temperature

Oranges being conveyed through the wax-fog to the brushing machine

Lemons taken from conveyors at the same time. All were of the same size and color. Those on the left were washed in borax solution, dried, and Brogdexed. Those on the right were washed and dried but not Brogdexed. The shrinkage of the untreated lemons in four months is such as to make them unsalable beside the treated fruit

one-sixth of the ultimate load. Using a conservative figure of 400 houses equipped, a connected load of 20,000 kw. in each and 2,000 hp. in motors is expected—an annual consumption of 35,000,000 kw.-hr.

Besides the revenue from load (conservatively estimated at $453,000 per year), when all plants are equipped, the motors, switches, transformers and other apparatus will represent some $280,000 in outlay. Such a field offers good opportunity for both utilities and contractors.

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Selling a Motor Specialist's Services

[*An address by Larry Ellett, Quality Electric Co., Ltd., Los Angeles, before the spring convention of the California Electragists*]

ONE OF the major problems confronting the electrical contractor specializing in industrial work is the increasing tendency among local plants to install their own electrical departments, thus eliminating the contractor from the picture.

That this statement is true to a considerable extent is an indictment of our industry, for it has largely resulted from conditions within our ranks. In enumerating these conditions, I think we may name them as follows: First, unsatisfactory work done by some particular contractor in some particular plant. This unsatisfactory work may have taken the form of improper engineering, resulting in inefficient costly operating conditions or expensive changes. It may have taken the form of careless work, or the installation of sub-standard materials, and it may have taken the form of over-charging, or greediness for extras. Any of these things leaves a bad taste in a customer's mouth and makes him susceptible to the suggestion that he put in his own electrical department.

The second count in this indictment of our industry is that certain distributors of electrical equipment have made it a practice to tell executives of factories, particularly the larger plants, that it is foolish to deal with the contractors; that more satifactory and economical electrical work may be had by hiring their electricians direct; that it is possible for them to buy supplies direct just as cheap as the contractor, thus saving the contractor's profit on both labor and material. Electrical manufacturers have in many cases gone much further than that, even offering the services of their engineering departments to meet the industrialist's electrical engineering needs in the making of layouts of switchboards, conduit and wiring.

The third cause to which I have alluded is the old bugaboo of jobbers' salesmen calling on industrial plants direct, in practically all cases quoting them at our costs and in some instances below our costs.

All of these troubles of which I have spoken are industry problems which may be eliminated by proper industry study and cooperation.

Naturally, the contractor will have to use his own resources to help correct this situation. The contractor who has not the experience and knowledge properly to engineer and install an industrial job should either stay out of that class of work or should consult the many sources of information available within the industry, so that he may be sure to know just what he is doing, why he is doing it and how to do it to give satisfactory results.

And now let me for a minute revert to my normal everyday role of a sales engineer for an industrial electrical contracting firm. I am about to contact the executives of a plant who are thinking of hiring their own electricians to install the work in an addition to their plant. What arguments may I logically present in attempting to convince these men that they are contemplating an unwise move?

First: I can certainly say to them that they are experts in their own particular line, which may be the production of steel, furniture or what have you. But they certainly have no training in the electrical industry. They are unable to decide whether their layout is proper for their needs, whether their men are using the proper and the most economical materials to attain the results desired, and whether these men are doing an honest day's work, for they have no experience in this particular line by which to judge a day's work, such as installing switchboards, running conduit or pulling wire. I have a good reason in this argument as to why such a firm should use our experienced engineering and installation ability.

Second: I should be able to advance the argument of buying power and price on electrical materials, though I may get whipped on this argument under present conditions in southern California. But I certainly can win out on the argument that on large installations there are, in the very nature of things, many articles left over, some of them often expensive articles, which the contractor can credit in and use on the next job, but which are left on hand where the plant does its own work. Such items are usually a complete loss to the plant under such circumstances.

Third: I can advance the argument that our men are power specialists, they know motor and starter work and can make a quicker and more satisfactory installation than the average contractor who does very little industrial work, and certainly a much better job than the so-called maintenance electrician, who is usually nothing more than a handy man.

I can cite the fact that when our men are through with the installation or trouble job, as the case may be, they are immediately taken off the job and their labor expense ceases, whereas the average handy man who has become a plant electrician is rarely any good for other work around the plant. The result is that when there is no electrical work for him to do he is hiding out or stalling to get in his time, and after he has done that for a little while he has become so lazy that he is of no value even as a handy man.

Fourth: I can make what is perhaps the most convincing argument of all when I call attention to the fact that the plant doing its own work gets no comparative cost estimates, and so is rarely able to know whether its work is being done for a proper price or not. It is human nature for the man who is working on a non-competitive basis to set up a high cost when giving an estimate on work. When the job is completed, if it has cost more than his estimate, the facts are concealed by some evasion or other. If it has cost much less the electrician also conceals that fact, building up to his estimate by becoming a petty grafter in some form, trading, selling or giving away surplus material, or stalling to build up the labor costs. So the figures turned in to the office and carried on the firm's books rarely represent actual costs on electrical work.

And as a closing, and we will hope a clinching argument, I can state that almost without exception the large automotive plants in the Detroit district, most of which formerly had large plant electrical departments, have discontinued these departments and are now calling on the Detroit electrical contractors both for electrical installation and maintenance. They have found this method to be cheaper in the long run and much more satisfactory from an operating point of view.

Underfloor Duct —A Description

By RICHARD R. F. LEHMAN
Western Manager, Walker Bros., Los Angeles

Historically, underfloor duct is of relatively remote origin, having been used as far back as 1905. Perhaps the simplest form consisted of a semi-circular section of fiber conduit installed in the floor fill upon a flat level cement pad provided for this purpose. The lack of structural integrity as well as difficulties in wire pulling led to the development of rectangular duct of 14-gage steel. Connections to both of these types of duct were made by drilling a hole in the top surface and expanding the fitting into place. Some manufacturers then developed the idea of incorporating into the duct a series of tubular inserts regularly spaced and of such height as to project the cap between the top of the duct and the top of the cement finish. The spacing of these so-called pre-set inserts was predicated on the fact that as long as the duct was located along the lines of probable desk locations, the 24-in. spacing would assure the presence of an available insert under any desk or piece of bookkeeping machinery.

UNDERFLOOR duct is one of the few electrical materials that must be installed by a contractor with extreme regard for location and elevation. In its installation great care must be exercised, and great care involves expense. The increasing use of underfloor duct in buildings up and down the Pacific Coast makes it necessary for electrical contractors to appreciate the care that underfloor installation requires so that their estimates shall properly contemplate the expenditure.

Briefly, underfloor duct is a glorified conduit, rectangular in section and normally provided with pre-set tubular inserts regularly spaced, through which electrical connections are made to the wires contained within the duct. A system involves cross-over, junction and pull boxes, dead-end fittings, duct supports and couplings, as well as finish or exposed fittings such as standpipes, floor covering holders, markers, etc. In addition there are fittings which make it possible to bring primary service to the duct system. Differences in capacity requirement have led to the establishment of two sizes of duct broadly classified as wide and narrow. The wide duct is 3⅛ in. wide and the narrow 1⅞ in., both being 1¼ in. high.

The accompanying photograph shows completely various types of underfloor systems and the various fittings in use. The top section marked "A" shows a single wide duct of the type used where a lot of service of the same potential is contemplated; that is, either a quantity of 110-volt service or telephone, telegraph, intercommunicating and buzzer systems. Although the code reads "Wires or interior wiring systems not electrically connected to each other within the building shall not be contained within the same raceway," this does not refer to low potential services such as those mentioned.

Section "D" shows a dual system consisting of one narrow and one wide duct. Such a system would be used for the distribution of 110-volt service, which would be contained within the narrow duct, and also the distribution of a number of low-potential systems.

Section "B" is a triple duct system such as would be used to distribute 110 volts in one duct, telephone service in another, and low-potential services in the third duct. Such a division of low-potential service, while not a legal necessity, is nevertheless desirable. The three-duct system might also be used for alternating current in one duct, low potential in another, and direct current in the third. With the use of card punching statistical machinery increasing rapidly, the distribution of direct current along with alternating current becomes an important factor.

That section marked "C" represents perhaps the broadest duct installation ordinarily made, two wide ducts with a narrow duct between them. This type of installation is similar in use to that described under "B," the size of duct varying to suit the predicted requirement.

To become familiar with the various fittings used in connection with an underfloor system it will be well to look again at the illustration. The duct and junction boxes are readily identifiable. At the right of Section "A" is, first, a dead-end fitting. Then comes a normal insert closed with a cap, the top of which finishes flush with the cement finish. The next insert is shown with a marker screw in its center. This screw would normally project through the supplementary floor covering (linoleum or rubber tile) to mark the location of duct in areas where no junction boxes are visible.

The relationship which these inserts bear to the cement finish is illustrated in Section "D" where a board is used to represent the cement finish. The cement surface is shown finishing flush with the top of the insert caps. The same section shows linoleum applied to the floor surface and shows a standpipe or service outlet installed. Since the brass top of the junction box normally finishes flush with the cement finish, as do the insert caps, it is necessary to identify the location of the junction boxes and this is done by using a fitting known as a linoleum holder. This is a brass dish of the same depth as the linoleum or other floor covering and is fastened to the junction box by screws as shown in the illustration.

Section "E" also shows the relationship between a duct installation and various types of floor finish. The white portion represents a marble, terrazo or travertine material. For materials of this type which are essentially thicker than linoleum, rubber, cork or similar materials, there have been developed deep-dish covers which bridge the gap between the top of the junction box and the finish floor surface, and also long shank fittings for the same purpose. The center section of this same panel shows the service outlets bearing directly on a cement floor. Under this condition water is prevented from entering into the system by using a rubber gasket under the hexagonal flange, a recess being provided in the bottom of the flange for the gasket.

Since an underfloor system is primarily designed to provide for changes, it is only reasonable to suppose that

outlets will be abandoned occasionally. For this purpose there has been devised an abandonment plug, such as is illustrated in two sizes in Section "C," which both closes the insert and covers the hole cut into the linoleum. Both the service standpipes and abandonment plugs are held in place by expanding the fitting into the insert tube. Since this does not necessitate the engagement of any threads, but is purely a sliding arrangement, it provides for maximum adjustability.

Recently a service fitting not shown in the illustration has been developed which, instead of being of the standpipe type, finishes flush with the floor covering. The use of this is possible only where the wide duct is used, but it reduces very decidedly the conspicuousness of the system.

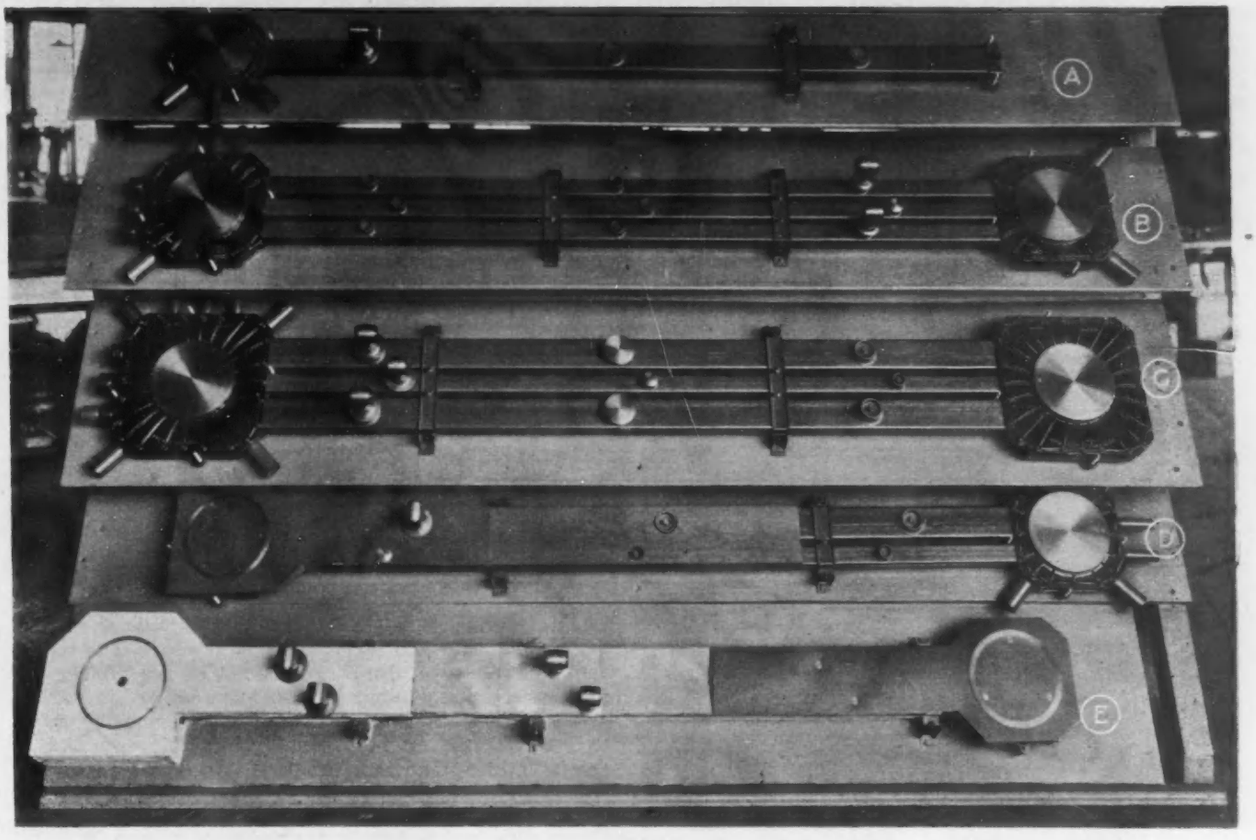
Standard 10-ft. lengths of duct are joined together by a coupling which is not shown. This fitting is of the slip-on type, being held in place by sharp-pointed screws which also serve to ground the joint. Such grounding screws are used at all points where duct enters a fitting. In the average installation, all joints that are merely slip-on are made water-tight by the use of "Smooth-On" paste.

It will be noted that each of the illustrated systems is held in place on the board by a fitting known as a duct support. In the case of a multiple duct system this duct support performs a double function: It not only supports the duct in the proper relationship to the surface upon which it sets, but the upper member is also so constructed as to serve as a spacer for the members of the system. These duct supports are so constructed as to be adjustable vertically to meet the needs of uneven floor surfaces. There are also legs of different lengths to accommodate different slab thicknesses or fill thicknesses. The bottoms of these legs are provided with holes by means of which it is possible to fasten the duct supports and consequently the duct to the wooden forms or to tin pans by means of Parker Kalon screws.

Junction or cross-over boxes are most interesting because in them the home runs enter and are broadcast into the system. Within the box are partition walls so arranged as definitely to separate the different classes of service with the proper provision for accessibility and crossing over. From the photograph it may be seen that each of these boxes has a single handhole which provides easy access to the service within and gives assurance of plenty of work space. This is a practical necessity because in the junction boxes the main feeders are split into branches.

These feeders can be brought to the junction box in three different ways. The simplest of these is to have the squared corners of the boxes drilled and tapped for the proper size conduit and the feeder screwed directly into this opening. Feeders of this type are seen extending from several of the boxes at 45-deg. angles. Where one of the duct openings of a box is unoccupied it is feasible and desirable to bring the feeder into this opening with a fitting known as a box adapter. This fitting screws on the conduit and has a squared end which fits into the duct opening. Normally these two methods for bringing in feeders would be sufficient, but where a three-duct system occurs it can readily be seen that it would be impossible to enter the center duct from a box corner. It is therefore necessary to feed the center run of a three-duct system either by means of a box adapter or, where all four faces of a box are occupied, by drilling and tapping into the bottom of the box. There have been several instances where this method of feeding has been used exclusively. Holes were left in the slab at the box location and, with the feeders running in the ceiling space below, connections were made directly to all of the boxes through the bottom.

The five most common types of underfloor duct



Where a branch extends from a junction box to a point where there would be no necessity for a junction box—in other words, a dead end—it is advisable to use a dead-end fitting, if for no other reason than to permit access to the duct so that it may be swabbed or blown out. Such a fitting is shown in Section "A."

All of the fittings normally encountered in the average underfloor duct system are covered quite thoroughly in the foregoing. Naturally, there have arisen special cases and these have resulted in the manufacture of special fittings. There are, for instance, side outlet couplings; duct to conduit couplings by means of which a conduit may be joined to a duct; wall elbows, by means of which a run of duct may be continued vertically in a wall or partition to a panel box; deep-dish covers for use where the duct system lies below a marble or travertine floor; blank washers for closing unused openings in junction boxes; and many others whose uses are more unusual.

Such a system as described above fulfills thoroughly the ultimate requirements for which it is intended. It is of such a character that its installation, if carried out with reasonable care, becomes a pleasure rather than a trial.

EDITOR'S NOTE: Another article dealing with the installation of underfloor duct under various conditions so that contractors will be better able to estimate installation costs, will be published in an early issue of ELECTRICAL WEST.

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More Light—Fewer Streaks

STREAKS on polished automobiles make the garage man miserable, so the manager of the Russ Building garage, San Francisco, handed to the California Electrical Construction Company the problem of making him happy and giving him an excellent sales feature by eliminating the necessity for streaks. Correct lighting of the polishing rack was the solution, and streakless polishing is now an advertised advantage.

Four banks of reflectors, each 7 ft. 5 in. from the floor, now surround the rack. Each side bank has eleven 200-watt Holophane units on 20-in. centers; the front and rear banks each have two similar units mounted 40 in. apart. The 26 units are mounted in metal housings suspended by chains from the ceiling. They are connected in four circuits. The load has been increased from 0.7 kw., with the bare lamps used before, to 3.4 kw.

The lens reflector is the most important feature of the installation for it confines the light to the area needed, prevents glare, and prevents specular reflection from the polished surface. This reflection, which exists under bare lamp conditions, is not only detrimental to the eye but usually makes impossible the distinguishing of streaks, which do not show up until the car is taken outdoors.

No streaks should remain on cars polished in this rack for the best lighting conditions exist

The former polishing rack installation has been moved to the wash rack just opposite, where it provides temporary light for this work until such time as a second similar lighting installation can be made.

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Inspector Promotes Adequate Wiring

AN EXAMPLE of assistance by a municipal inspection department in promoting adequate wiring installations is found in a recent communication to architects, builders, and contractors in Portland by L. W. Going, chief electrical inspector of that city. The communication, to which were attached specifications for adequate wiring in different occupancies, called attention to the tendency on the part of architects and builders to specify the minimum standard of the city's electrical code, which has led to monetary loss to owners through the expensive alterations, extensions, and replacements subsequently found necessary. The letter urges those responsible for the design of wiring installations to use the specifications suggested instead of the bare requirements of the code so that the job will prove to be satisfactory from the standpoint of the current user. The letter follows:

The tendency on the part of architects, builders, and contractors to use the minimum standard of the city's electrical code or the National Electrical Code as a maximum specification, and failure to give due recognition to the ever-increasing trend in the use of electric current for lighting and other applications, has in the past not only seriously inconvenienced the user of electric current, but has also caused great monetary loss by shortening the useful life of wiring installations, or by making necessary expensive alterations, extensions, and replacements.

Those responsible for the design of wiring installations are cautioned that the degree of adequacy provided for by the code must of necessity be the very minimum permissible from the standpoint of safety. It should not, therefore, be taken for granted that an installation which meets the requirements of the code and no more will be entirely satisfactory from the standpoint of the current user.

For these reasons a specification covering the design of wiring installations is presented for your guidance. The requirements are intended to provide in each room or space ample circuit and outlet capacity for any normal and reasonable use of electric current in that room or space. These requirements will, in so far as they apply, be accepted in lieu of the requirements of Article XVIII of the city's electrical code.

The specifications, in which are embodied some of the standards developed by The Society for Electrical Development, the N.E.L.A., and other national organizations, cover dwelling occupancies, commercial and public buildings, and industrial occupancies,. Under Part I for dwellings, methods of securing adequate capacity are suggested for the following divisions of the wiring job: Ordinary and special branch circuits, appliance outlets, fixed appliances, and services for both single- and multi-family dwellings. Similar divisions of the wiring job in commercial and public buildings are covered in Part II of the specifications, with special attention being given to general lighting in various kinds of rooms and to special lighting for store buildings. In Part III covering industrial occupancies, only branch circuits, general lighting and service, and feeders are covered.

Lighting the Oregon Caves

SITUATED in the Siskiyou National Forest, about 50 miles from Grants Pass, Ore., the Oregon Caves were once a national monument but now are administered by the Forest Service. Because of the number of tourists who daily visit this labyrinth of holes and passages on various subterranean levels, a resort consisting of a hotel and several cottages had sprung up at the entrance. But with the meager light of the portable acetylene lamps used by the guides in taking parties through the caverns, the best features of the remarkable rock formations were not brought out.

Modern electric light has ended all that. A system was installed recently by the NePage-McKenny Co., contractors of Portland, which makes the caves safe for the exploring tourist and is so adjusted as to bring out the salient features of each of the wonders of this tourist Mecca. The intensities have been worked out so that a visitor is not aware of the presence of artificial light and the units themselves have been hidden in niches and crevices in the rock structure so that normally they are not seen.

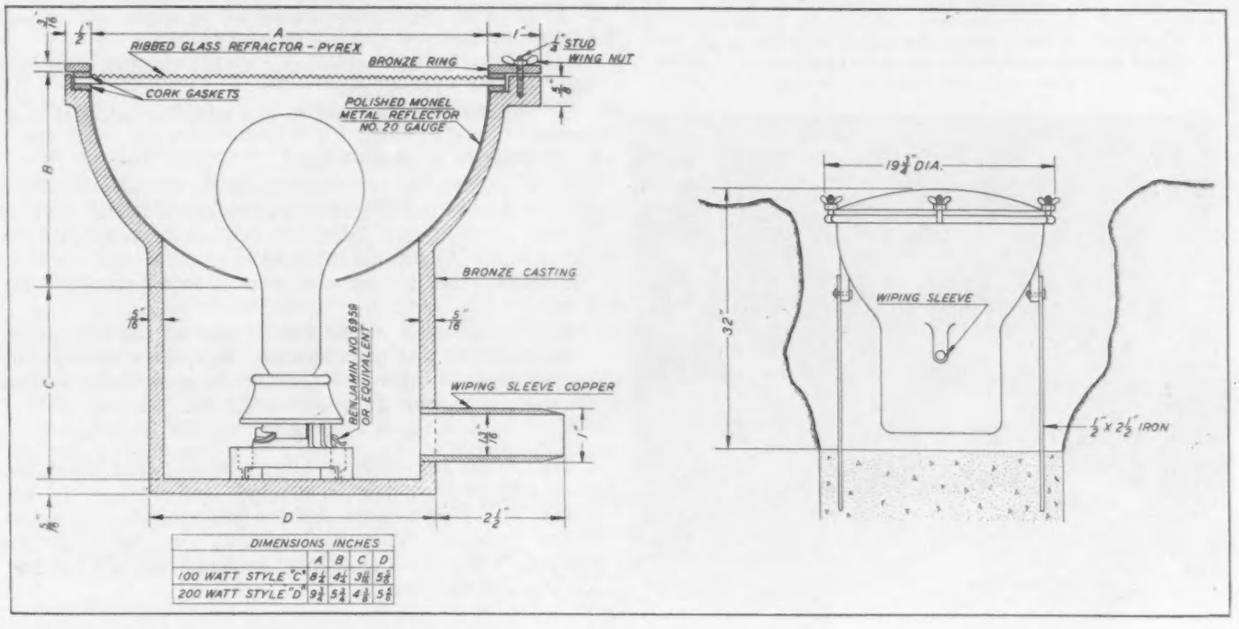
Designed and installed under the direction of the Forest Service at Portland, the lighting system is nearly 1½ mi. long, and because of the necessary paralleling, nearly 3 mi. of circuit is installed. One hundred and eighty units, a load of 20 kw., are used and 30 switches, some of them 3-way, control the various circuits. The job was not designed for uniform intensity or brilliancy, but simply to make easier and safer the exploration of the formations by tourists. For instance, colored lenses are used in the "Ghost Room" to produce a fire effect.

An 80-hp. diesel engine direct connected to a 45-kw., 2,400-volt, 3-phase, a.c. generator supplies power from an outside building. In this building are also a switchboard and a 5-kw., 2,400/120-volt transformer for station service. From it runs distribution cable to two distribution centers inside the caves. Two transformers are located at the first distribution point near the entrance, a 15-kw. unit serving the lodge and cottage with light and heat and a 10-kw. unit for lighting one end of the system. The other end is served by a 15-kw. unit in the "Ghost Room."

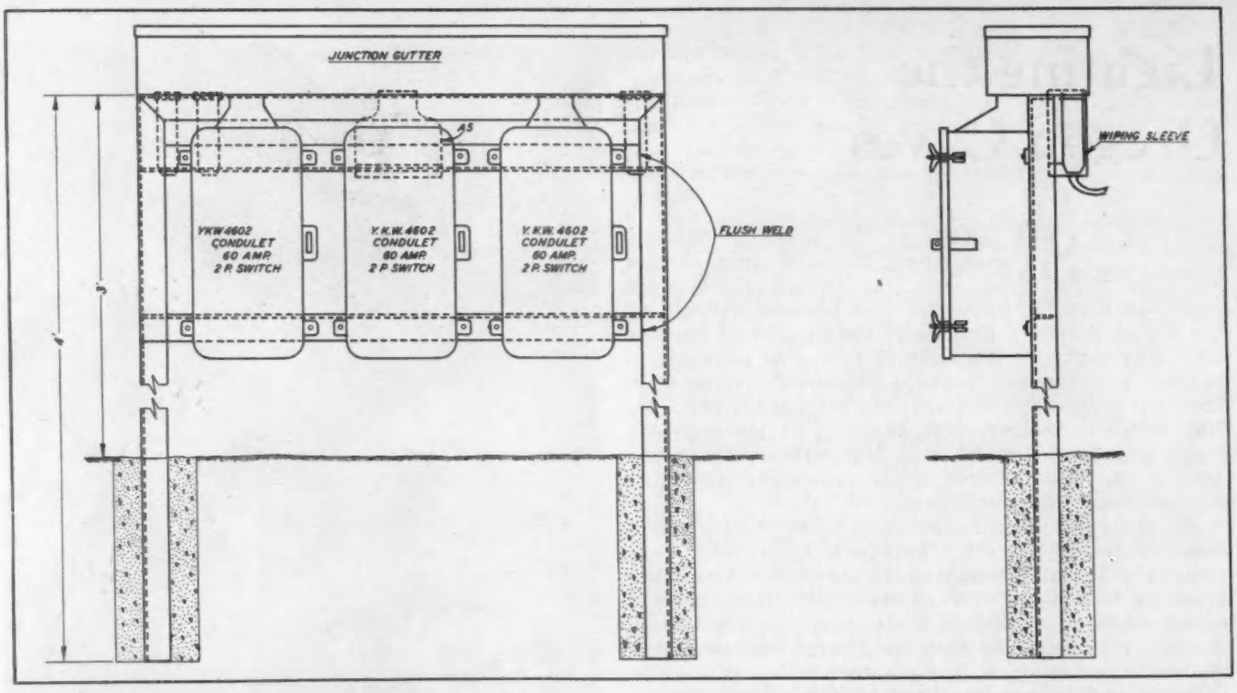
Distribution within the caves (2-wire, 120 volts) is accomplished with 2-, 3-, and 4-conductor, rubber-covered, leaded cable in sizes from No. 6 to No. 12. Primary cable is 2,500-volt; secondary is 600-volt. Because of

No light other than that provided by the new system in the caves was used in making this view of the bridge crossing the "River Styx"

Details of the reflector units used for both 100-watt and 200-watt lamps may be seen in the drawing on the left. On the right is shown the method of hiding the unit behind rocks and in niches



DIMENSIONS INCHES	A	B	C	D
100 WATT STYLE "C"	8½	4½	3⅛	5⅛
200 WATT STYLE "D"	9½	5¼	4⅛	5⅛



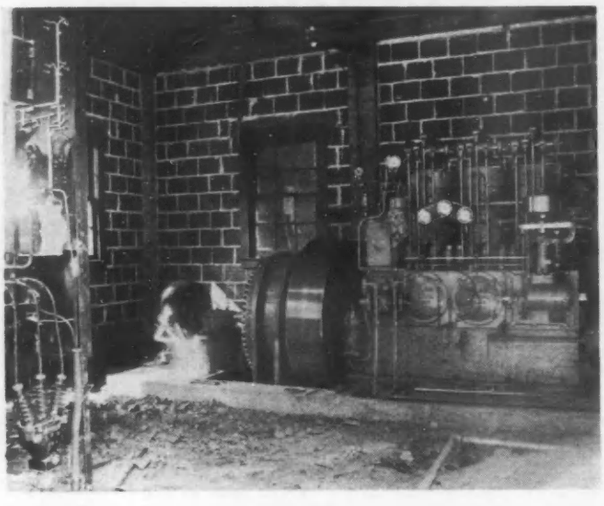
Front and side views of the distribution equipment in the "Ghost Room." Another similar distribution center is located near the cave entrance

dampness, all splices, fittings, fixtures, switches and fuse compartments are of waterproof design and all connections are wiped in.

Three types of fixtures are used for the different wattage lamps required; 134 are equipped with 50-watt lamps, 36 with 100- and 200-watt lamps, and 10 with 500-watt bulbs, the largest used. The latter are the standard fountain lighting units.

This installation cost approximately $23,000, the plant being operated and maintained as a concession by an organization of business men from Grants Pass. James Frankland, Forest Service assistant regional engineer, was in general charge of the work with Charles Gowan as the department's resident engineer. Much of the original design was the work of George Pettingill, Jaggar-Sroufe Co. (Portland) engineer, then acting in consulting capacity for the Forest Service. C. W. Hayes, of the NePage-McKenny Co., had charge of the work for the contractor and E. A. Hicks, of that company, superintended the installation.

The power house, outside the caves, contains an 80-hp. diesel engine connected to a 45-kw. generator. Switchboard may be seen to the left



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Electrical "Boners" Made in Examinations

ONE of the season's popular humorous books lists a number of wrong answers to examination questions made by children. The "boners" made by children in examinations are nothing compared to some of the electrical "boners" made by applicants to electrical inspectors for licenses as wiremen or contractors, many inspectors claim. As a sample, one inspector recently submitted the following to ELECTRICAL WEST. Other inspectors doubtless have better ones. They will be welcome comedy relief in a serious world, and ELECTRICAL WEST will pay for those used.

Q. Why is acid never added to a battery?

A. Because the action would be so great as to neutralize the battery making it useless.

Q. If the battery terminals should become corroded how may they be cleaned?

A. With alcohol because it is a non-conductor of electricity.

Q. What is a short circuit?

A. A short is where two wires of a circuit come to a contact before passing through the machine the juice is to run. This lets the juice flow in a continuous line without slowing it up to do its work.

Q. How small a wire can be used as a substitute for a fuse?

A. By placing it in the female part of the fuse apparatus with one end of it against the copper plate in the bottom and the other end against the side of the socket. This is not as good as a standard fuse.

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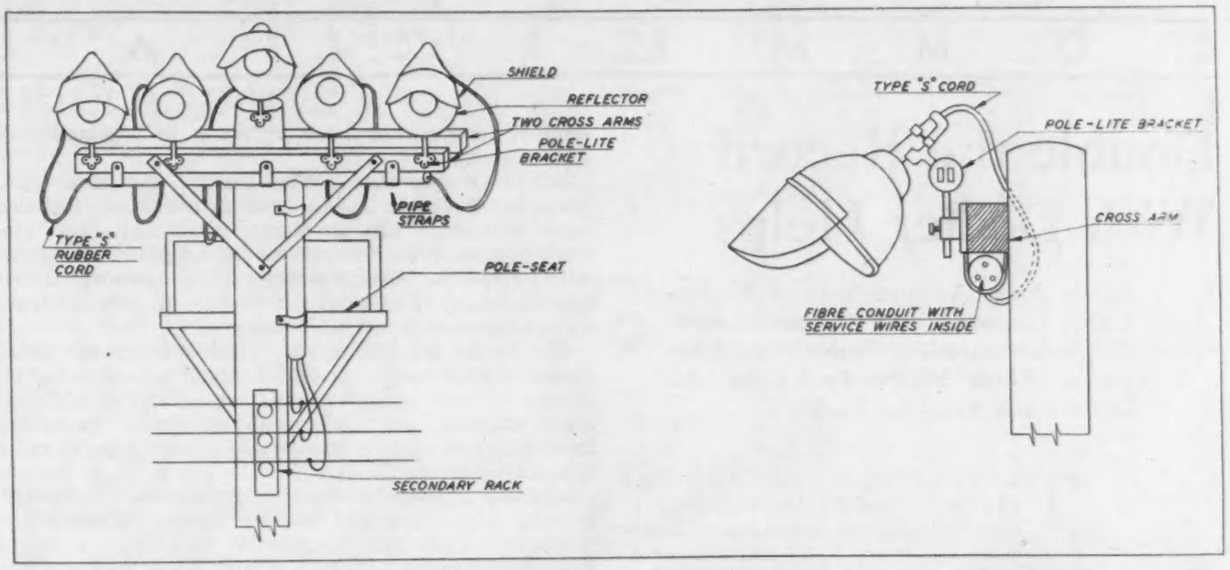
THE FIELD FOR AIRPORT LIGHTING, desirability of the load, airport financing in general, and methods of approach in selling airport lighting are subjects covered in a new booklet, "Airport Lighting," by the Lighting Bureau, N.E.L.A. Copies may be had from 420 Lexington Ave., New York.



Front and side views of lighting units. Twenty-five reflectors with 1,000-watt, 115-volt lamps are used on each side of the field. The setscrew shown supporting the bracket on the right allows the reflector and bracket arm to be removed to replace lamps or to clean reflectors without disturbing the unit's focus

Protection Against a Last-Minute Rush

A Comparatively Inexpensive, Yet Easily Installed Football Stadium Lighting System Is Outlined Here to Save Contractors Some Head-Scratching

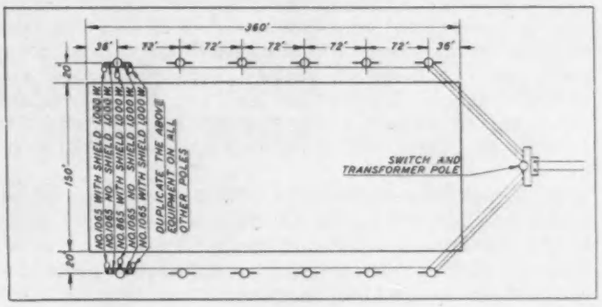
By F. B. NIGHTINGALE
Illuminating Engineer, General Electric Supply Corp., Los Angeles

IT OPENS this month—the 1931 football season. For about three months now, players and public will be keyed up and less fortunate business managers will be worried about the nightmare of empty stands and will be watching attendance reports at night games.

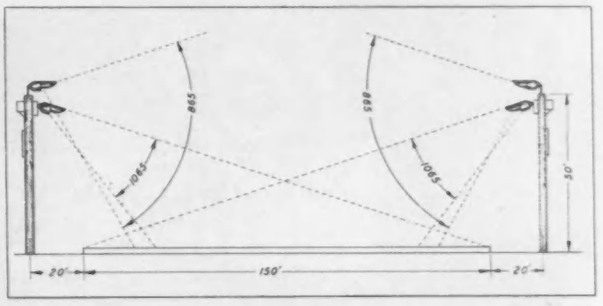
Many contractors will get hurried calls to install a hasty, yet well-nigh perfect, night lighting system for certain high school and small college stadiums and, not having sufficient time to plan a layout adequately, will be doing some head scratching. Here is help in the form of a recommendation involving a limited amount of time and capital.

As shown, the installation will furnish enough light for both regular games and practice work. However, if an increase in illumination is desired (and the following practice is recommended) burn the lamps at 10 per cent over-voltage during games. This gives 38 per cent more light with a decrease in lamp life of 70 per cent. The average life of a 1,000-watt lamp is 1,000 hours; if decreased 70 per cent the life would still be 300 hours, equal to 100 games of three hours each and more than most schools play in several years.

To obtain this result, equip an auto transformer with double-throw switches and install it on the main transformer pole. It is then possible to play games under increased voltage and to drop back to normal for practice work.



All equipment should be mounted 50 ft. above the playing field on poles spaced 36 ft. from the goal lines and then on 72-ft. centers. Poles should be 20 ft. back from side lines. If an auto transformer is used with double-throw switches for over-voltage lighting, it should be placed on the pole at the extreme right



Note the positions of the units in the drawing at the top of the page. Each projector should be adjusted on one pole at a time with all others dark. Focus the reflectors of the Ivanhoe No. 1065 type so that the beam strikes the opposite edge of the field. Focus the reflectors of the No. 865 type straight out at right angles to the pole. Two of the former are used without shields

Double the Record With Dealer Helps

In Its First Attempt With a Dealer-Utility Campaign, the El Paso Electric Co. Appears to Have Found That Midas Touch Which Makes Profits for the Dealers and Load for Itself

TWENTY-FIVE El Paso (Tex.) firms and the El Paso Electric Co. have just completed a joint campaign on Everhot cookers, a campaign exemplary in all respects—amicable relationships were made and preserved and the two objectives of the drive, to encourage outside merchants to push electrical goods more actively and to increase the domestic kilowatt-hour consumption, were realized. In the 30-day life of this, the power company's first cooperative campaign, approximately 800 cookers were sold, more than twice the number turned over during any previous appliance sale.

To a great extent the company restricted its participation to promotional activities designed to help the sales of the other merchants, including hardware dealers, druggists, jewelers, furniture dealers, department stores and specialty shops. During the first two weeks company salesmen and district representatives made no effort to sell the appliance, selling only to customers who came into the salesrooms.

To launch the campaign a dinner was prepared on cookers and served in the utility's salesrooms to about 80 representatives of the firms participating. J. H. Warden, utility sales manager, outlined the plans and declared the position of the company was that of helper rather than competitor. Considerable enthusiasm was aroused, enthusiasm later reflected in extraordinary sales records.

All advertising was handled through the power company, which planned and paid for the campaign. Included were newspaper advertisements, direct-mail literature, radio programs, demonstrations and telephone interviews with prospects. Advertisements in the newspapers carried the names of all campaigning dealers. An unusually large amount of direct mail was used.

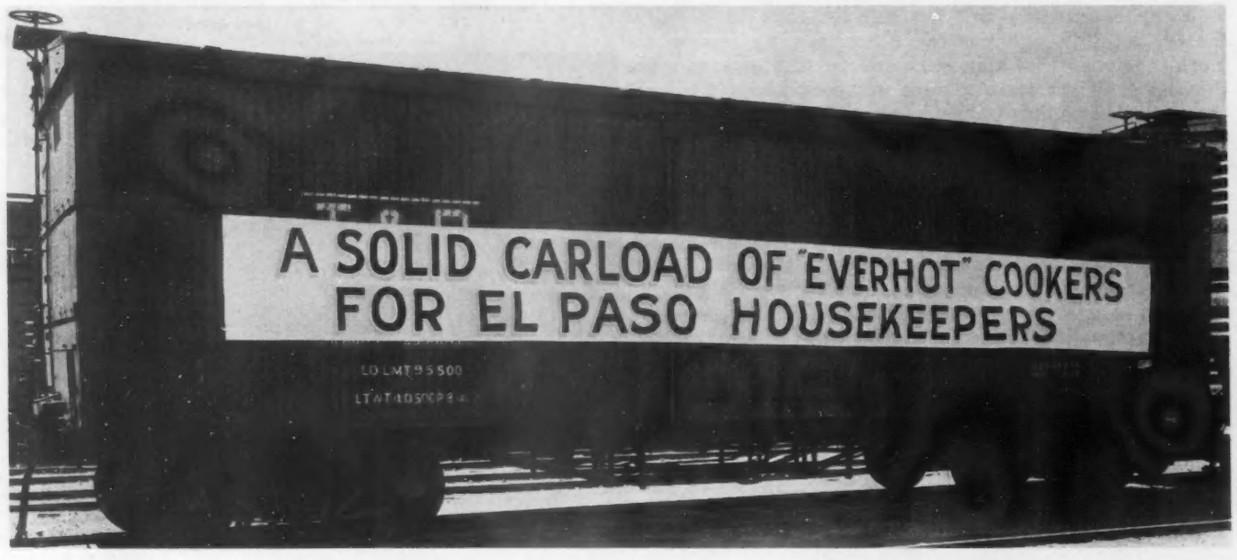
Besides the regularly sponsored radio programs, which produced good results, a radio hook-up with a cooker on display in front of the electric company's office attracted much interest. A microphone attachment permitted brief sales talks during intermissions in the regular radio broadcasts during the day.

Assisted by home economists of the utility, a factory representative conducted frequent demonstrations at the stores of the different merchants. These were found to be highly effective, as were the window and floor displays used.

Girls were hired to phone every electricity user in town and spread information about the sale. A section of the phone book was assigned to each girl to make certain that no one would be missed. Impersonal relations were exercised in these calls. No mention was made of the power company, all prospects being referred to a favorite dealer.

For this event a special price of $9.95, with terms of 95 cents down and $3 monthly, was offered. All firms were supplied with cookers on consignment from the El Paso company's stock and, where it was desired, the company assumed responsibility for the collection of time payments, requiring only that the credit ratings of the customers be acceptable. However, practically all firms made their own collections.

The result of this campaign has helped the utility's public relations both with customers and appliance merchandisers. It has helped the company correct the impression that its retailing activities flow principally into competitive channels. In fact, one merchant has been quoted as saying that the volume of his electric appliance business has tripled within recent months and that he attributes much of this added business to promotional work of the El Paso Electric Co.



Slogan for the selling harvest was that which appeared on the side of this box car. But even a carload was mere child rations to El Paso dealers

How Much Radio Interference?

FOR THE first time, so far as is known, quantitative data have been obtained on the relative amount of radio interference caused by small, series-motor driven household appliances and the effectiveness of filters in suppressing it. The tests were made on a recent afternoon in South Pasadena, Calif., by G. R. Walters, interference department, Radio and Music Trades Assn., and Fred B. Doolittle, radio engineer, Southern California Edison Co. Ltd.

Appliances used were food mixers and juice extractors of various makes. The appliance listed as No. 6 is of interest since it proves that radio interference can be suppressed successfully by the manufacturer. The report of the tests follows.

TEST No. 1. Appliances were operated in the garage and interference observed on a Radiola 80 in the living room of the house. The Radiola was installed with a good outdoor antenna and a ground to the water system. The set was tuned to station KFSD on 600 kilocycles some 130 miles away. The radio field intensity from KFSD at this location and time was 80 microvolts per meter as measured with a General Electric radio noise meter. The radio set was operated at normal room volume; there was no fading or other interfering noise at this location on this set. The interference created by the appliances was observed as compared with KFSD signal and classified as follows:

Appliance No.	Satisfactory Reception	Light Background	Heavy Background	Reception Blanketed
1				X
2			X	
3		X		
4		X		
5		X		
6	X			
7			X	

TEST No. 2. In order to get some quantitative data for comparative purposes, the appliances were operated in the living room with and without filters. The radio noise meter was coupled to the house wiring, which was of knob and tube construction, through two 0.006-mfd. condensers. A 500,000-ohm potentiometer was connected across the two condensers, which were plugged directly into a convenience outlet in the dining room about 25 ft. away from the outlet from which the appliances were operated. The drop across a portion of the potentiometer was fed to the radio noise meter in order to bring the readings on the meter scale. Signal strengths of KFSD and KGFJ were used as calibration standards. Readings were taken with the appliances as furnished by the manufacturers and also with the following filters:

0.1-mfd.—A 0.1-mfd condenser was connected from each brush to the motor frame.

G.E.—A General Electric capacitor for suppressing radio interference, consisting of two condensers in the same housing having three leads coming outside, was applied, one outside lead to each motor brush and the center one to the motor frame.

A Tube Filterette (No. 110P0) consisting of shunt capacitors and series inductance was connected between the appliance and the convenience outlet, the ground terminal on the Filterette being connected to the motor frame.

Appliance No.	No Filter Microvolts (R.F.)	Per Cent R.F. Voltage .1 mfd.	G.E.	Reduction 110PO
	Data at 1,200 Kc.			
1	4,200	95	93	100
2	10,500	94	95.5	98
3	2,820	88	91	91
4	1,140	42	42	100
5	500	84	84	100
6	9	....	.....	100
7	71,400	....	.....	100
	Data at 600 Kc.			
1	11,200	60	60	100
2	1,090	65	63	100
3	1,640	84	87	95
4	1,020	45	46	100
5	3,600	80	78	100
6	0	....	.....	.....
7	6,300	....	.....	99.9

Appliances No. 6 and No. 7 were identical in outside appearance but No. 6 is as now furnished by the manufacturer and is claimed to be non-radio interfering. No. 7 is as before radio complaints resulted in the improvement shown in No. 6.

All the appliances were new except No. 1, which had been in normal use for approximately two years. They were all operated without load and at full speed when variable speeds were provided.

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Even Children Can Help Sell Washers

NEWSPAPERS, arch-students of human nature and psychology, were among the first agencies to employ children in campaigns of one kind or another, for they knew the parents would bear good-will to the agency that gave the children an opportunity to earn. Also, newspapers realized that parents, in their desire to see the child successful, would do much of the work themselves.

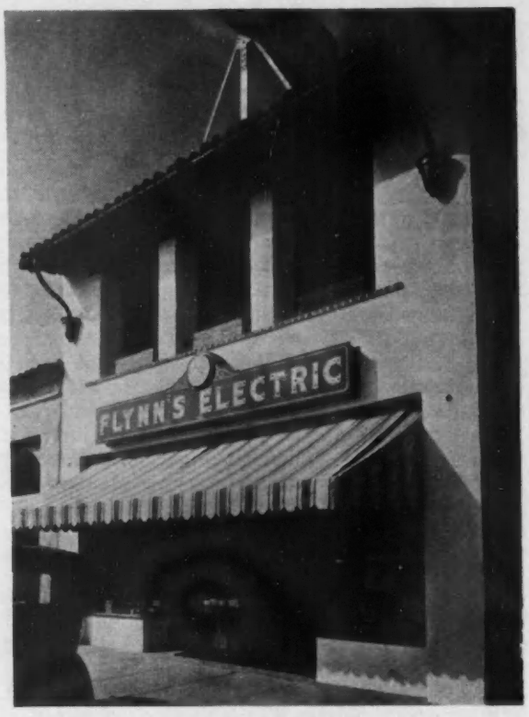
This learning has been applied successfully by the New State Electric Company, Phoenix, Ariz., in a series of appliance sales campaigns. Lately, children have been used to uncover washing machine prospects.

Three of the firm's salesmen appeared before schools in the more prosperous neighborhoods one day and passed out cards to the children, instructing them to fill in the names of two housewives without washers and return them next day to the firm's representative in front of the school, to receive a bright skull cap. In addition to the prospect names, the child was asked to have his mother sign the card and state whether or not she was a washer owner. This insured the attention of the parents in the campaign. Of the 1,400 names turned in by 700 children, only one was fictitious; the remaining 1,399 were pruned until 400 likely prospects remained. An intensive campaign of letters and solicitation sold 25 washers during the first weeks of the campaign and a hundred other prospects give excellent indications of purchasing.

The campaign was staged at a cost of $75, most of which was spent for the skull caps. Another campaign, using toy airplanes, is now being prepared, for the company knows the value of "kid employment."

For the "Newer Spanish" Customers

SANTA BARBARA is a city of Spanish homes and Spanish architecture—even for its commercial and civic buildings. It was natural then when Jack Flynn, staunch Electragist of that city found quarters cramped at his old location on State St., that he should build a new "castle in Spain" of his own on Chapala St., the newest business thoroughfare. A distinction of the new place is its Spanish simplicity, not alone of building design but of display arrangement. Its air of quality is derived from the class of appliance handled. Refrigeration has long been a specialty with Mr. Flynn, who has installed units in many of the large homes at Montecito. In the new store, fixtures are given greater prominence. Major appliances make up the bulk of the merchandise trade of the firm, and high-class residential and commercial installations its wiring business.



Conforming in style to the prevailing Spanish architecture, and although located on a new and developing business street, the neon signs both on top of the building and on the facade, the latter embodying an electric clock, attract the customers to the new store shown at the top of the page. The company is agent for these signs, in addition to being an active merchandising and contracting establishment.

Right—The entire second floor is given over to fixtures. This large cheery room, opening on the balcony shown above, is for fixture display and demonstration. A room in the rear is an assembling and manufacturing plant for fixtures

Left—On the main floor is the complete appliance display, with office, estimating room and storeroom at the rear. Constantly changing the window display and store arrangement is a profitable habit to cultivate, Jack Flynn has found. Likewise it is good practice to be able to demonstrate wiring adequacy and home electrical features such as the door chimes at the center of the picture. The stairs lead to the fixture room above

Heating Stock Water During Zero Weather

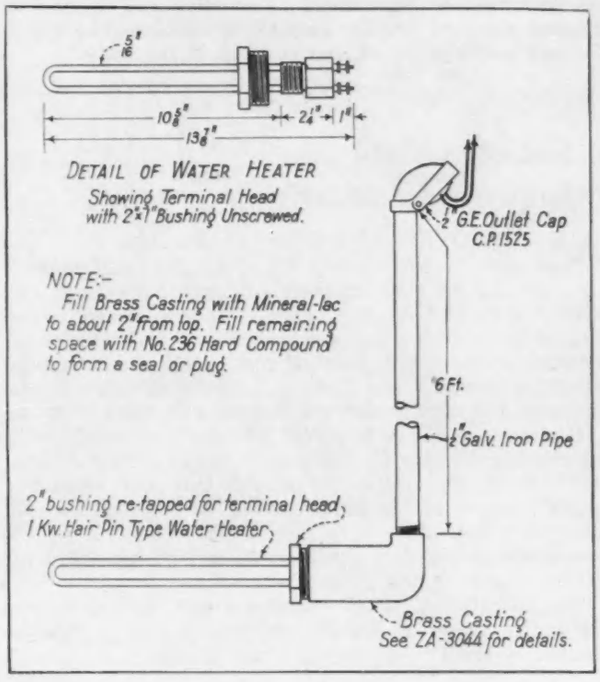
By J. B. McLAIN
Sales Engineer, Idaho Power Co., Boise

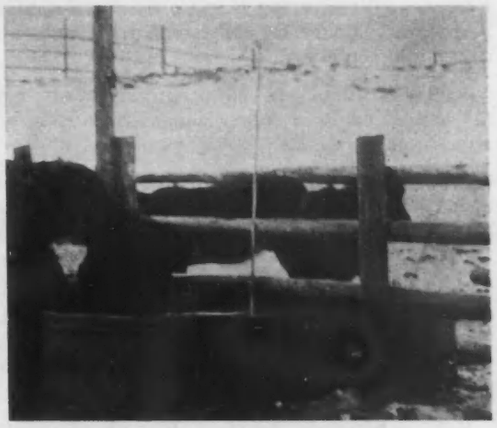
IN THIS territory the desirability of heating drinking water for stock during the winter is becoming appreciated more and more by cattle and sheep ranchers. It has been found that if the chill is taken off drinking water when the temperature ranges around zero and below, the stock will drink more water, will feed better, and generally will come through a severe winter in a more healthy condition. Here is a job that admirably lends itself to performance by electricity.

The Idaho Power Co. has experimented in this field for some time and now has several electric water heating installations for heating stock water which are proving quite satisfactory. One of the largest of such installations was installed on the beef cattle ranch of Neil Jensen near Milner, Idaho. On this ranch, 1,250 head of beef cattle were fed during the winter and were watered in six round wooden tanks, 10 ft. in diameter, carrying about 18 in. of water.

To warm the water in the six tanks the electric installation consisted of two 1,000-watt, 230-volt, hairpin-type electric water heaters for each tank assembled as shown. These were immersed in the tank and the circuit was carried up to a height of 6 ft. in conduit to clear the cattle. This gave the assembly a portable character which appeared to offer advantages of simplicity and safety over the other possible method of inserting the heater through the side of the tank. The heaters were connected through a three-heat switch to produce high, medium or low heat as needed, depending upon the temperature of the air. The heaters were manually controlled. The tanks were not insulated.

Typical heater assembly





Vertical heater installed on Jensen ranch. Connections were made high enough to clear all cattle

It is felt that some saving could have been effected through the use of smaller tanks equipped with float valves to control the water level, but conditions did not permit this type of installation. Water was delivered to the tanks from a canal by an automatic pump and discharged into each tank by hand at will. It was necessary to drain the pump and pipe lines each night to protect them from freezing, and to maintain some overnight storage in the tanks.

Temperatures dropped as low as 26 deg. below zero, so that more heat was required than would have been under more normal conditions. During the entire season 18,453 kw.-hr. were consumed which, at the company's regular water heating rate of ½c. per kw.-hr., brought the total season's water heating cost to $276.80, or 22c. per head. In spite of the fact that the installation was not considered to have been the most efficient possible from an engineering standpoint, this cost proved to be not excessive for the amount of benefit to the stock in health and contentment, and the owner was well pleased with the results.

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Principles of Merchandising Procedure Adopted by N.E.L.A.

AT THE recent Atlantic City N.E.L.A. convention, the following statement of merchandising procedure was submitted by the utility subcommittee to its electrical merchandising joint committee and accepted:

It is recommended that electric utility companies take the initiative in bringing about conferences with dealers in their localities to the end that the following or other mutually acceptable procedure be recognized, adopted, and put into use for the purpose of stimulating the sale of suitable electric appliances and promoting the use of electric service in a way that will be mutually advantageous to the consuming public, the utility, the appliance manufacturer and all merchandising outlets.

1. The distribution of electric appliances should be on the basis of fair and open competition in the interest of the consuming public, the utility, the appliance manufacturer and all merchandising outlets.

2. All electric appliances offered for sale by cooperating agencies should be standard appliances.

3. No appliance or merchandise not directly related to the use of electricity should be sold by electric utilities.

4. In all merchandising activities the retail price of all

electric appliances that have received reasonable customer acceptance should be consistent with present-day merchandising practices.

5. There should be no premiums given nor trade-in allowances made in connection with the sale of any such appliance.

6. The presenting to the public of those electric appliances not having received reasonable customer acceptance should be considered as promotional activities and not as merchandising activities.

7. Coordinated advertising of approved appliances should be developed by electric utility companies and local dealers, and the electric company should give all reasonable assistance to the dealer in advertising, displays, and sales assistance.

8. The deferred payment feature of merchandising activities should be on an economically sound basis.

9. There should be a segregation of the accounting of the merchandising departments of power companies from their public utility functions and all items of expense incurred in the merchandising of appliances should be charged to the merchandising activities.

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Keep Electric Cooking "Sold"

CUSTOMER service, believes the Southern Colorado Power Company, should be continuous and not only be available to housewives, but actually reach into the home, for that is where the trouble, if any, exists. So the company not only operates a cooking school each week, except for an open schedule during the summer months, but has a very active home service department.

Ernest F. Stone, assistant general manager of the company, has given the department much personal attention, regarding it as bearing a vital relation to company progress.

If unusual results have come from the permanent cooking school, it is because the policies and methods followed have been right. Perhaps the most fundamental object of the school is to help housewives who have electric ranges to keep their bills reasonable, and hence keep electric cooking "sold." One of the striking methods used by Mrs. Clara Davis, instructor, to teach the difference between handling a range correctly and handling it inefficiently, consists in using two ranges, each on an individual meter. An identical meal is prepared on both ranges, but whereas one range is handled expertly, the other is handled as about three-fourths of the housewives do. The expertly handled range consumes 2 kw.; the other range 14 kw.

Definite policies have evolved from the experiences of the cooking school. One of these is that the recipes and instructions must be for any make of range, gas or electric. It is a policy never to make a derogatory statement concerning a gas range. One woman even inquired during a class, "How would you handle that on an oil stove?" and Mrs. Davis told her, carefully.

Another policy is to confine recipes to dishes which typical families can be expected to use. Still another is the abstinence from direct advertising in cooking lectures. Mrs. Davis has listed certain practical tips for handling the permanent cooking school. Among these are:

1. Choose a day of the week that is favorable, and start on time.

2. Make the class comfortable.

3. Use anecdotes extensively, placing them away from the city.

4. Get the audience to ask questions.

5. Don't use too many technical terms.

6. There must never be an argument with the class.

7. Break up the class routine with an occasional party.

It is a policy with this utility to check up on every range sale made. At the outset, dissatisfaction is discovered in individual cases, the basis of this learned, and the proper instructions are administered. In handling these complaints, the company sends Mrs. Lillian Klein right into the home. Here she spends hours instructing housewives how to combine menus so that each dish will cook within a given time, how to use less overheat, and the sanitary care of the range.

Much of the information which a housewife needs is contained in the book of directions which goes with every range. However, experience has taught that few range owners read the book diligently and the promotion of this book is one of Mrs. Klein's chief tasks. In doing this, she never directly asks the question, "Have you studied the book of directions?" Instead, she brings up the subject of recipes and refers to those which are given in the instruction book, thus arriving at other information in the book.

One of the answers which Mrs. Klein never gives to a question is, "I don't know." She may not know the answer then, but she will obtain it as soon as possible.

How company customers feel toward her and her willingness and ability to aid was illustrated on a recent holiday when thirteen different housewives telephoned Mrs. Klein in connection with problems they were encountering in preparing the dinner. Evening telephone calls are very common throughout the year.

The Southern Colorado Power Company has a high saturation of electric ranges and the general success of its merchandise department is excellent. Two of the reasons ascribed are the permanent cooking school and the company's policy of service right in the home.

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Society Offers Improved Advertising

AN IMPROVED advertising service has been announced by The Society for Electrical Development, Inc., to take the place of the old service maintained for central stations for many years. The new service offers central station advertising managers the highest type of artwork at the lowest possible cost, a $10 a month subscription charge. An Eastern advertising agency has prepared the copy under the direction of the society.

Commenting on the improved service, W. Royce Powell, advertising director for the society, says: "This service will be more than ordinarily valuable this year, when the whole practice of the industry will be to economize all along the line, since here is a concrete way in which power companies may continue their high standard of advertising work at a greatly reduced cost."

The advertising, which includes a mat service, covers the entire range of heavier appliances, and is supplemented by blotters, cards, and letter inserts.

School Heating on a Degree Day Basis

"Electricity, no doubt, is man's ideal heating agent. It has the peculiar advantage of being constantly available and can be regulated at will. It never destroys oxygen, nor does it vitiate the atmosphere. It is the cleanest and safest known method of heating."

By PROF. WARD H. AUSTIN
Marin Junior College, Kentfield, Calif.

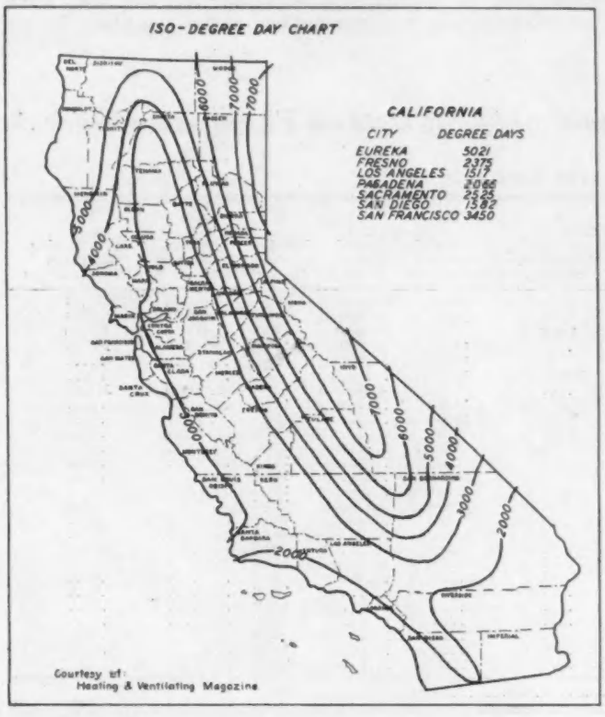
In his thesis prepared for a degree of Master of Science in Electrical Engineering, Prof. Ward H. Austin, of Marin Junior College, made a painstaking study of school electric heating which contains many valuable factual data useful to the electrical industry because of their fundamental nature. In this and one or more subsequent extracts, these will be assembled. Particularly interesting is the degree-day method of cost comparison, which offers a convenient, quick, convincing and sufficiently accurate tool by which contractor-dealer, manufacturer or central station salesman may make operating cost estimates to school boards and others contemplating electric heating. Prof. Austin's conclusions and recommendations bear a stamp of impartial authority which should go far to convince even the skeptical.

USE of electric heat for major space air heating is warranted when careful analysis indicates that one or more of the following conditions prevail:

(1) When because of efficient application it is found cheaper than other methods.
(2) When over-all costs are cheapened because of lower labor expense.
(3) When the possible higher cost is warranted because of improved working conditions.
(4) When the increased safety, convenience and cleanliness provided warrant a higher expenditure.
(5) When operating costs are of minor importance compared with the results to be accomplished.
(6) When other forms of heat would be difficult to apply.
(7) When the hours requiring heat are a small number of the 24 per day.

When planning a new school building, one of the most perplexing problems usually confronting a school board is the manner in which the building shall be heated and ventilated. There is no doubt that proper heating and ventilation have more to do with health and efficiency of school children than any other thing. The type of fuel to be used is generally the question of greatest concern.

Typical iso-degree-day chart, in this case for California. Similar charts are available for every state. The method of using these for quick calculation of approximate heating cost is described herein



Most board members are fully informed and have had experience in the use of coal, wood, gas, and oil, as fuels, but the advantages or disadvantages of electricity as a source of heat have not been given widespread publicity, since it is a more recent and more modern method of heating. A large amount of information may be obtained on steam, gas, and coal heating installations. At the present time, however, only a few short incomplete magazine articles are available treating the results of electric heating in schools or other major space air heating installations. It was the desire to present the truth of the matter to school men and to justify, if possible, the electric heating of many schools in California, that prompted the preparation of this report.

In order to form a basis for comparison of electric heating costs, field trips to the various installations were made, installation information obtained, characteristics of operation ascertained in so far as it was possible to do so.

Attempts to obtain installation cost information were looked upon with suspicion. While it is relatively easy to obtain cost data from the heater manufacturer, and it may be said that in every instance this information was given gladly, it was impossible to find anyone who would do more than venture an opinion on the cost of installed apparatus.*

The cost varies considerably in different locations. The accounting and filing methods used in schools, offices of superintendents of schools, and in the state offices are such that this item is lumped in with other construction costs and is generally lost. The actual cost of the heating units may be obtained in each case from the manufacturer. The cost of the following installations, however, has been obtained and is known to be accurate.

To permit comparison between the different schools, the volume heated in each case has been expressed in

* EDITOR'S NOTE—Prof. Austin had no means of knowing of the disastrously competitive situation in electrical contracting as respecting school installations and hence the variance of installation costs, which sometimes bear little relation to actual cost figures. His averages derived from the figures he found available, however, may be taken as approximately correct.

terms of equivalent classrooms, each a unit of 10,000 cu. ft.

It was found from the tabulation of the results of the electric heating installation costs for five schools, that the cost per equivalent classroom varies from $122.60 to $388.81, the average being $274.56.

Three Methods of Comparison

If it is a difficult matter to obtain accurate cost data in regard to the installation of electric heating equipment, this is not true in the case of the operation cost. When these data were not available at the schools, it was generally possible to obtain the information from the power companies or the manufacturer of the particular heaters installed.

Operational cost data for schools of various sizes which are located so as to include nearly every climatic condition encountered in the state have been obtained and tabulated. From this material three methods were derived for estimating the energy cost of proposed electric school heating installations.

The first method takes into consideration the space to be heated and expresses energy cost in terms of cost per equivalent classroom or per 1,000 cu.ft. Room dimensions for computing volume were obtained for seven schools, a summarization of data used to obtain energy cost per unit volume being given in an accompanying table.

The second method for estimating energy cost makes use of a constant derived by means of the empirical formula:

$$\text{Kw.-hr. per month per kw. connected load} = \frac{\text{Kw.-hr. consumption in 7 heating months} \div \text{kw. connected.}}{7}$$

The average of the sixteen installations is then 40.7 kw.-hr. per month per kilowatt connected load. The larger the school the smaller the consumption in kilowatt-hours per month per kilowatt connected load although, in one instance, that of Placerville, the reverse is true. This is because of the fact that Placerville is in a very cold part of the state, and requires more heat during the heating season than any of the schools in regions which have more nearly average California climate.

On this basis the cost of electricity for the seven heating months for any school installation could then be expressed as:

$$7 \times \text{kilowatts installed} \times 40.7 \times \text{average rate per kilowatt-hour.}$$

The average rate will depend upon the size of the installation, construction, and the type of contract the consumer desires to make with the power company. The rate averages about $0.0233 per kilowatt-hour in the schools studied, but varies so much with each installation that no attempt could be made to obtain any figure that would hold for this class of service.

The third method of comparison is by means of the relatively new term "degree days." By this means it is possible to compare the electric school heating costs in any locality with those in any other locality provided the degree days and the average yearly rate per kilowatt-hour of electric energy are known or may be computed. Furthermore, this comparison may be extended to any point in the United States by means of the iso-degree-day charts.

Degree Days

Degree day as a unit for measuring heating requirements is a word coinage by which heating requirements not only may be measured but comparisons made between heating loads under different climatic conditions or at different points. It is the product of temperature difference and a time factor for one day. In common with nearly all units, an empirical element is necessary, this being the zero point of computations. Manifestly, in each locality there may be determined the number of days of the year on which the average temperature is below 65 deg. F. This period may be called the heating season.

If, then, we have the mean daily temperature of 60 deg. F., it is evident that for this day we can measure the heat requirements by the figure of five days, whereas, if the mean temperature had been 55 deg. F., the heat requirement would be ten days, or twice as great.

Summing up, therefore, for a week, a month, or a heating season, we may express the aggregate heating load of any locality in units which permit comparison with that of another point. Likewise, we may compare the heating requirements of any given place during

Summary of Cost Data on Twenty-six California

INSTALLATION COST DATA

	School	Location	A Volume Cu. Ft.	B Floor Area Sq. Ft.	C Glass Area Sq. Ft.	D Number of Equivalent Class Rooms	E Cost of Entire Plant	F Installed Kw. in Heater	G Heating Installation Cost	H Cost of Heating Installation per Eq. Cl. Room
1	Esparto Union High	Sacramento	207,803	15,300	2,776	20.7	$83,000	198	$5,198.75	$251.15
2	Esparto Union High	Sacramento	207,803	15,300	2,776	20.7	83,000	198	5,198.75	251.15
3	Marin Junior College	Kentfield	70,724	5,921	1,098	7	30,815	95	2,415.00	345.00
4	Philip Sweed School	Petaluma	141,686	.....	....	14	67,000	170	3,740.00	265.24
5	Cora Williams Institute	Berkeley	106,662	8,204	984	10.6	.....	55	.....	.....
6	Cora Williams Institute	Berkeley	106,662	8,204	984	10.6	.....	57	.....	.....
7	Tamalpais High School Annex	Mill Valley	75,984	.....	....	7.6	41,805	124	2,955.00	388.81
8	Loomis Grammar School	Loomis	177,733	.....	....	17.8	.....	177	.....	.....
9	Clarksburg Union School	Clarksburg	103,525	8,254	2,056	10.3	.....	117	.....	.....
10	Kelseyville High School	Kelseyville	57,544	5,587	1,178	5.75	.....	87	.....	.....
11	Tiburon School	Tiburon	41,640	3,776	485	4.1	.....	20	.....	.....
12	St. Frances School	Sacramento	.....	.....	....	...	.....	211.3	.....	.....
13	Berryessa School	Santa Clara Co.	.....	.....	....	...	.....	208.0	.....	.....
14	Benicia High School	Benicia	.....	.....	....	...	.....	171.3	.....	.....
15	Benicia High School	Benicia	.....	.....	....	...	.....	171.3	.....	.....
16	Placer Union High School	Auburn	.....	.....	....	...	.....	250.0	.....	.....
17	Sunol Primary School	Sunol	.....	.....	....	...	.....	103.5	.....	.....
18	Geyserville Primary School	Geyserville	.....	.....	....	...	.....	90.0	.....	.....
19	Colusa High School	Colusa	.....	.....	....	...	.....	347.0	.....	.....
20	Riverside School	Sacramento	.....	.....	....	...	.....	44.5	.....	.....
21	Folsom High School	Folsom	.....	.....	....	...	.....	121.0	.....	.....
22	Folsom High School	Folsom	.....	.....	....	...	.....	121.0	.....	.....
23	Wheatland School	Wheatland	.....	.....	....	...	.....	95.0	.....	.....
24	Wheatland School	Wheatland	.....	.....	....	...	.....	95.0	.....	.....
25	Clarksburg High School	Clarksburg	.....	.....	....	...	.....	147.0	.....	.....
26	Clarksburg High School	Clarksburg	.....	.....	....	...	.....	147.0	.....	.....
	AVERAGES							135.3		

one heating season with those of any other heating season. Charts have been devised for gas, coal and oil.

It is therefore an easy matter to make a direct comparison for electric heating, since the charts prepared are on the basis of 100 per cent efficiency, and electricity is actually 100 per cent efficient as judged from the application end only.

By reference to the map, heating costs may be accurately estimated or compared with any installation in the state. Furthermore, by reference to the data sheets as given in the *Heating and Ventilating Magazine* specified, this same comparison may be extended to any point in the United States and for any type of fuel used.

To facilitate comparison of schools heated or desiring to heat by electrical energy in California, an iso-degree-day chart has been prepared. As a further aid in this comparison, the cost of electric energy per degree day per equivalent classroom of 10,000 cu.-ft. volume is shown tabulated for the schools studied in the table accampanying this article. The basis of the preparation of this column is:

$$\frac{\text{Cost of electric energy per eq. classroom per year}}{\text{Degree days per school}} = \text{Cost of electric energy per eq. classroom per year per degree day}$$

The average cost of electrical energy per degree day per year per equivalent classroom of 10,000 cu. ft. in the schools studied was $0.0195.

As an example of an application of the final average values of cost of electric energy data from the table given, assume the following:

In a locality where the degree day figure is 3,450, and the average cost per kilowatt-hour of electric energy is $0.025, what will be the amount billed for electrically heating a school building of 20,000 cu.ft.?

Solution: Multiply 3,450 (the degree days) by $.025 (rate per kilowatt-hour assumed), and by $0.0195 (the average cost per degree day, as shown in accompanying table), and by $\frac{20,000}{10,000}$, and divide by $0.023 (the average rate from this table), or

$$\frac{3,450 \times \$0.025 \times 20,000 \times \$0.0195}{\$0.023 \times 10,000} = \$146.25 \quad \text{(amount billed per year)}$$

So much for the methods of comparison as such. In a subsequent article comparisons of cost of operation between electricity and steam, wood and coal, and gas systems will be studied and an example of calculations based upon these data will be made. In this manner any particular school heating installation may be estimated with something approaching the accuracy which is possible in consideration of older types of heating installations. Likewise in the next article a thought regarding possible combined systems will be discussed. A third article later will give results of some actual heater tests and the data obtained as to distribution of heat, the effect of window ventilation, and some practical problems involved in thermostatic regulation of school building temperatures.

Inherent Advantages of Electric Heat

An electric heating system offers inherent advantages which must be considered in determining the type of heating plant to be installed in a school.

1. Electric heat is instantly available in any quantity desired, each heater being provided with three heats.
2. Electric heat is flexible, so that one room, or as many as desired, may be heated.
3. Electric heat is readily available for night or extension classes when the remainder of the system may be closed down.
4. Repairs to one part of the system will not interfere with the operation of the rest of the system.
5. Because of the absence of combustion a large share of the fire and explosion hazard is eliminated.
6. Since electric heat is clean, having no soot or ash problems, the cost of maintenance of walls, ceilings and furnishings is low.
7. The need for boiler and furnace space is eliminated entirely, providing a saving in excavations and foundations.

Public Schools Together With Comparison Averages

		ENERGY COST DATA						DEGREE DAY DATA		
I Schedule	J Year	K Amount Billed	L Consumption Kw.-hr. Total 12 Mo.	M Average Cost per Kw.-hr.	N Kw.-hr. per Month per Kw. Connected Based on 7 Heating Months	O Cost of Energy per Equivalent Class Room	P Cost of Energy per Year per 1000 Cu. Ft.	Q Degree Days	R Cost of Energy per Eq. Classroom per Degree Day	
P_1 PG&E Max. Demand	1923-1924	$786.81	23,120	$0.034	30	$38.01	$3.80	2250	$0.0168	1
P_1 PG&E Max. Demand	1924-1925	946.93	42,240	.022	..	45.74	4.57	2250	.0200	2
C_1 PG&E	1927-1928	675.81	33,800	.020	48	96.50	9.65	4000	.0241	3
GWPCo. Max. Demand	1927-1928	647.18	28,580	.023	..	46.20	4.62	3000	.0154	4
C_1 A PG&E	1922-1923	462.95	21,760	.021	57	55.50	5.55	3000	.0185	5
C_1 PG&E	1927-1928	600.00	28,650	.021	..	56.60	5.66	3000	.0185	6
P_1 PG&E	1927-1928	683.02	33,852	.021	..	91.20	9.12	3500	.0199	7
P_1 PG&E Max. Demand	1924-1925	536.83	24,300	.022	..	30.40	3.04	2000	.0158	8
C_1 PG&E	1923-1924	702.61	32,268	.022	36	67.00	6.70	3500	.0191	9
C_1 PG&E	1925-1926	839.92	35,557	.023	55	146.00	14.60	5000	.0292	10
C_1 PG&E	1925-1926	109.25	4,360	.025	30	60.50	6.05	3500	.0178	11
P_1 GWPCo.	1924-1925	789.96	37,640	.021	25	....	....	....	....	12
....	1927-1928	1,070.74	30,100	.035	20	....	....	....	....	13
....	1926-1927	794.92	28,900	.027	22	....	....	....	....	14
....	1927-1928	669.63	19,000	.035	..	....	....	....	....	15
....	1927-1928	2,085.05	107,200	.019	59	....	....	....	....	16
....	1927-1928	645.20	32,260	.020	43	....	....	....	....	17
C_1	1927-1928	514.48	21,720	.023	35	....	....	....	....	18
C_1	1927-1928	1,940.97	97,800	.019	39	....	....	....	....	19
Special City Rate	1924-1925	353.80	22,669	.015	70	....	....	....	....	20
P_1-B	1924-1925	743.90	30,320	.024	27	....	....	....	....	21
P_1	1925-1926	564.14	25,440	.022	56	....	....	....	....	22
C_1	1924-1925	476.98	20,560	.023	..	....	....	....	....	23
C_1	1925-1926	780.90	38,100	.020	..	....	....	....	....	24
C_1	1926-1927	925.70	44,984	.020	..	....	....	....	....	25
C_1	1927-1928	1,491.63	73,248	.020	..	....	....	....	....	26
		$805.35	36,097	$0.023	40.7	$66.69	$6.69	3181	$0.0195	

Engineering and Purchasing Departments of Portland Companies Merged

CONSOLIDATION of the engineering departments of Pacific Power & Light Co. and Northwestern Electric Co., Portland, and their subsidiaries, under H. H. Schoolfield as chief engineer, and the purchasing departments of the Pacific and Northwestern companies and Portland Gas & Coke Co., under A. W. Angell as purchasing agent, was effected early in August. The three companies are operating properties of American Power & Light Co., with headquarters in Portland, and have had consolidated accounting and legal departments or some years.

H. H. SCHOOLFIELD
. . . heads consolidated engineering department

Mr. Schoolfield, who has been in the engineering department of the Pacific Power & Light Co. since 1911, was made assistant chief engineer of that company in 1915 and chief engineer in 1917. He has been active in electrical engineering circles in the Northwest, having held many important positions in the A.I.E.E. and the Engineering Section of the Northwest Electric Light & Power Assn.

E. F. Pearson, likewise a veteran electrical engineer in the Northwest, having joined the Northwestern Electric Co. organization in 1912, became chief engineer of that company a year ago. He will function in much the same capacity as formerly with the title of assistant chief engineer in the newly consolidated department.

Mr. Angell, who took part in the construction of the Northwestern Electric Co.'s system in Portland in 1911 and later held positions in the engineering and accounting departments, became purchasing agent for the company in 1917. In the newly consolidated purchasing department is also included control of the stores of Pacific Power & Light Co. and Northwestern Electric Co. with J. B. Kilmore, formerly purchasing agent for the Pacific company, as general store keeper.

A. W. ANGELL
. . . purchasing agent for three companies

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Hoover Dam Strikers Back at Work

Advices from Hoover Dam as ELECTRICAL WEST went to press were that, while a portion of the men continue on strike, work was being resumed following the general walk-out of workmen earlier in the month.

Trouble arose when 30 muckers were displaced by mucking machines and assigned to work for which the scale was $4. As muckers they were being paid $5 a day. They walked out and induced all other workmen on the payroll of the Six Companies, Inc., to strike for higher pay. The contractors answered the strikers' demands for higher wages by closing down the entire project. It has been suggested in some quarters that the contractors were glad to take advantage of the ill-advised action on the part of the workmen to close down operations on account of the extreme heat. Construction work on the dam, in spite of the time lost through the strike, is almost six months ahead of schedule.

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ELECTRICAL WEST INDEX ISSUED—An index to Volume LXVI of ELECTRICAL WEST has been compiled and is ready for distribution. Copies may be obtained upon request of this publication at 883 Mission St., San Francisco.

Way Cleared for Cle Elum Dam Construction

Erle J. Barnes, director of conservation for the state of Washington, announced last month, simultaneously with an announcement from Washington, D.C., that power issues which have been tying up work on the Cle Elum Dam have been settled satisfactorily, and that work on that $3½ million project in the Yakima River Valley will proceed at once. Moxie power plant calls for construction of a 14-mi. canal from Selah Gap to Union Gap, where the power house will be erected.

The question arose as to whether or not the government would be permitted another eastern Washington project to produce power in excess of that actually necessary to carry on pumping operations, and what disposition should be made of power profits when the cost of dam and power station shall have been paid.

Signing of the contract will mean two and one-half years' work for a force of from 500 to 600 men. The diversion tunnel, 1,500 ft. long and 18½ ft. in diameter, will divert lake waters while the earth-fill dam is being constructed at the end of Lake Cle Elum, and will later serve to carry released waters from the lake to irrigation projects.

Completion of the dam will allow future development of the $12 million Roza division, reclaiming another 60,000 acres.

Under the permits issued by the state, the power plant will be returned to the irrigation district, subject to congressional approval, when the profits from operation have repaid the construction costs.

The priority question, which has been one of the obstacles, will be settled by the government filing amended applications for diversion rights, with the special proviso that it is waiving none of the rights given it under the act of 1905, according to Charles J. Bartholet, state supervisor of hydraulics. The 1905 act provides that the reclamation service shall be entitled to priorities, dating form that year, on its water rights. State's attorneys have questioned the validity of the act, and first issued permits dating the priorities for the Roza and Kittitas divisions of the Yakima project from 1930.

Approximately $150,000 revenue a year will be afforded from the Moxie River plant when it is completed, according to Mr. Barnes. During summer months at least 30,000 hp. will be furnished by the plant to be wholesaled to private power companies for about 4 or 5 mills a kilowatt-hour, he says. In winter months, however, there would be hardly more than four or five thousand horsepower for sale. Thus, the revenue from the sale of power would be practically clear profit since there would be no interest or taxes applied as long at it remained in the ownership of the federal government.

Price of Butter-Fat Determines Energy Rate

California Oregon Power Co., Medford, Ore., has been authorized by the California Railroad Commission to reduce by 10 per cent the contract rates under which it supplies electric energy to irrigation districts in Siskiyou County, Calif., such reduction to remain in effect for the present season or as long as the price of butter-fat remains below 35 cents per pound at Montague.

This reduction results from a voluntary offer by the power company temporarily to relieve the dairymen's depression by assuming a share of the season's losses based on the ratio between the cost of electric service and the total cost of producing butter-fat.

In determining the extent of this reduction a joint study was conducted on the ground by one of the commission's engineers, the company's division manager and representatives of the several irrigation districts. From the facts thus obtained, the figure of 10 per cent was derived and appeared to be satisfactory to all parties concerned.

This is the first instance of record where a utility has approached the subject of relief from the standpoint of production cost.

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Idaho Municipal Plants Must Pay Kw.-hr. Tax

The municipal power systems generating their own electricity in Idaho must pay the one-half mill kilowatt-hour tax recently levied in that state on all electricity generated in the state, the same as private companies, according to a ruling of the attorney general. The ruling was made in response to a request by the commissioner of law enforcement who had been advised by the city attorney of Idaho Falls that this city would contest this tax on the power generated by its municipal plant on the ground that municipalities are constitutionally exempt from taxation.

The attorney general pointed out that the provisions of the kilowatt-hour tax were such that the exemption of municipalities did not apply, and that the tax must be paid by any organization producing power for barter, sale or exchange.

It is expected that the Supreme Court of the state will be called upon to make a ruling in the case. In the meantime, by a decision rendered Aug. 20 by three federal judges in statutory court at Boise, the kilowatt-hour tax is held constitutional in so far as the state questions raised were concerned. The court also held that the question as to whether or not the entire operation of generation, transmission and distribution of electric power is in interstate commerce was one upon which it desired further information. That part of the question is therefore left open for further evidence. A temporary injunction had been obtained against the attorney general by the Utah Power & Light Co. in July preventing the collection of the tax from that company. (See ELECTRICAL WEST, April 1, 1931, p. 206, and Aug. 1, 1931, p. 93.)

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Colorado River Aqueduct Bonds up to Voters

Member cities of the Metropolitan Water District of Southern California will vote on Sept. 29 on the proposed $220 millions bond issue for construction of an aqueduct to bring Colorado River water to the Southern California coastal plain. The board of directors of the district on July 24 fixed the date of the election by unanimous vote. Under the law governing the Metropolitan Water District bond issue, a majority vote is required to authorize the issue, rather than a two-thirds majority.

The first survey work on the proposed aqueduct was started in 1923, and in 1925 a $2 million bond issue was voted in Los Angeles to carry forward the engineering studies. In 1927 the state of California adopted the Metropolitan Water District Act and a year later the State Supreme Court pronounced the act constitutional. In December, 1928, the Metropolitan Water District was formed at Pasadena with eleven original members.

Cities now included in the district are Anaheim, Beverly Hills, Burbank, Compton, Colton, Fullerton, Glendale, Long Beach, Los Angeles, Pasadena, San Marino, Santa Ana, Santa Monica and Torrance.

San Bernardino, one of the first cities to join the district, in an election held Aug. 4 last voted to withdraw therefrom. The vote on the proposition stood "Yes," 3,052; "No," 972.

In the same election San Bernardino also rejected a proposal that the city contract with the federal government to purchase electric power from the Hoover Dam power plant. The city was to receive a share of the 6 per cent of the power allocated to a group of southern California cities originally designated by the federal government as Hoover Dam power allottees.

Decision by the city of Riverside, Calif., to refrain from contracting for Hoover Dam power was also announced recently.

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SIERRA PACIFIC CO. WOULD BUY NEIGHBORING UTILITY—Subject to the approval of the California Railroad Commission, the Sierra Pacific Power Co., Reno, Nev., has entered into an agreement with P. M. Doyle to purchase the Truckee Electric Light & Power Co., Truckee, Calif., of which he is the owner, president and general manager. The public utility serves Truckee, which is also served by the Truckee Public Utility District, which purchases power at wholesale from the Sierra Pacific Power Co. The date of hearing by the Railroad Commission has not yet been set.

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Pioneer Days at Santa Monica, Calif.

Styles of days gone by blossomed out anew when citizens of Santa Monica, Calif., held their second annual Pioneer Days celebration in June. Men and women of the Santa Monica Bay District commercial staff of the Southern California Edison Company Ltd. joined in the festivities and wore their pioneer costumes during office hours. C. N. Elgan, the Edison company's Santa Monica Bay District manager, is standing at the right in the photograph, in the costume that was the vogue for gentlemen about the time Jenny Lind gave her first concert in the United States

Off Peak Water Heating For Puget Sound System

Off-peak water heating service on a meter rate of 8 mills per kw.-hr. was made available to its customers on Aug. 7 by the Puget Sound Power & Light Co., Seattle. The new rate is unique in that it offers service for a maximum of 18 hr. per day with a 6-hr. off period controlled by a time switch set to open the water heater circuit during the daily system peak of 2 hr. in the morning and 4 hr. in the evening. A self-starting synchronous clock time switch is installed on each water heater circuit just outside the cabinet box and remains the property of the company along with the meter.

Heaters used on this rate are of the storage type, thermostatically controlled. Each separate heating installation may be limited to 5-kw. capacity at the company's option and heater capacity may not exceed 60 watts per gallon of storage tank capacity. Where installations require over 1,000 watts of heating capacity to give adequate service at times of abnormal use of hot water and to assist in quick recovery, two units, both automatically controlled, are installed on the tank,—one to heat the upper half of the tank, the other to heat the entire tank. Tank and heater insulation are required in the rate, in order to give adequate and economical service to the customer.

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Three Oregon Water Permits Rejected

Noncompliance with rules and regulations provided by an act of the Oregon Legislature of 1931 in connection with the conservation of state water resources is the stated ground upon which the Hydro-electric Commission last month based rejection of three separate applications for permits to appropriate water for power purposes. The petitions denied were filed by C. T. Darley and H. E. Bennett, involving the appropriation of 1,200 sec.-ft. of water from the North Santiam River for the development of 14,000 hp.; the Oregon Light, Power and Irrigation Co., covering the appropriation of 549 sec.-ft. of water from the Clackamas River for the development of 998 hp., and the Cascade Utilities Co., of Oakridge, asking for authority to appropriate 60 sec.-ft. of water from Salt Creek for the development of 447 hp.

Applications filed by Charles H. Lee, and Romaine W. Myers, of Berkeley and Oakland, Cal., respectively, covering permits to appropriate 1,500 sec.-ft. from the Illinois River for the development of 113,000 hp., also were denied by the commission. These applications were denied because the proposed projects provided for the canalization of the Illinois River water to the Rogue River where several dams and hydro-electric units were to be constructed. Under an existing statue, holds the commission, the waters of the Rogue River have been withdrawn from appropriation for power purposes by virtue of a section of the act providing that no obstructions or dams may be placed in the river bed for a distance of 100 mi. from its mouth in the Pacific Ocean.

Messrs. Lee and Myers have notified the Oregon commission that action for damages of $4,756,967 will be instituted, with the commission members and the state named as defendants. Original filings were made by the claimants on the Illinois and Rogue Rivers in 1929, prior to the passage of the legislative act of the same year withdrawing the Rogue River from power development.

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Radio Interference Made Midemeanor in Oregon

Trade in radio and other electrical appliances in Oregon will be affected somewhat by two bills recently passed by the Oregon Legislature and signed by the governor. Under one of these the malicious operation of any device or apparatus causing reasonably preventable electrical interference with radio reception within the corporate limits of any city in the state between 6 p.m. and midnight is made a misdemeanor and punishable by a fine of from $50 to $500. X-ray machines are specifically excluded.

The other bill prohibits the removal or defacement of the manufacturer's serial number or other identification mark from a number of specified commodities including the following sometime or always electrically operated devices: Radio, piano, phonograph, sewing machine, washing machine, adding machine, comptometer and vacuum cleaner. Such removal or defacement must, according to the bill, be accomplished for the purpose of violating the terms of contract for purchase or sale of such devices, in order to be classed as a misdemeanor and subject to fine of not more than $500.

Gas in Arc-Welded Pipe

Two operators with shielded - arc tie - in welds, simultaneously arc welding the gas line of the Southern Fuel Co. which will bring gas from Kettleman Hills, Calif., into Los Angeles. Welding of the line is being done by the Welding Engineering Co., Bartlesville, Okla., using Lincoln Electric Co. welding equipment

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Revenue Increase Shown By Utilities in 1930

While the total electric output of the United States decreased 0.9 per cent during 1930, revenues from all classes of consumers increased 2.7 per cent during the year. These figures are determined from reports from some 400 companies representing approximately 92 per cent of the entire electric light and power industry in the United States, and are published in Statistical Bulletin No. 7 of the National Electric Light Assn.

There was a decline during the year of 0.5 per cent in kw.-hr. sold, the increase in revenue being accounted for by the fact that most of the falling off in the use of energy was confined to large industrial power, which has the lowest rate classification. There was a steady and consistent growth during the year in the use of domestic electric service, the report shows, and the employment of electricity in the home has thus far reflected little of the present general business depression. In fact, the average domestic consumer in 1930 increased his use of electricity by 9.6 per cent, while his average rate decreased by 4.8 per cent. The average unit price for domestic electric service stood at the end of the year at 6.03 cents per kw.-hr.

Approximately 87,550 farms were added during 1930 to the list of those served by electricity, an increase of 15.7 per cent over the previous year. While the average for the country of farms so served is but 10.2 per cent, in California, Massachusetts and Washington more than one-half of the farms are electrified.

California now has 81,250 farms served by electricity; New York, the state having the next greatest number, has 57,030. Washington is fourth on the list with 41,653, being exceeded by Ohio with 45,767.

In number of customers of all classes California is third on the list, and fourth in total number of wired

homes. In total generating capacity California stands second of all the states.

The percentage of revenue paid as taxes by electric light and power companies in the United States has trebled in 25 years, according to the N.E.L.A.'s bulletin. Gross revenue from domestic service increased approximately 650 per cent during the period, but taxes went up 7,000 per cent, or more than ten times as fast.

If all electric light and power companies should be relieved of all taxation and directed to apply all money paid in taxes to the reduction of rates for domestic service, the bulletin points out that the average domestic rate of the nation would be reduced from approximately 6 cents to 4 cents per kilowatt-hour.

In the year 1902, according to a table published in the report, the taxes paid by electric light and power companies totaled $2,654,885, representing 3.4 cents out of every dollar of consumer revenue and 8.7 cents out of every dollar of investor's income. By 1922 the companies' total taxation had increased to $73,128,440, or 8.4 cents of every consumer revenue dollar and 18.6 cents of every dollar of investor's income. The taxes paid by companies in 1929—the last year for which figures are available — totaled $187,500,000, which represented 9.7 cents out of every dollar of consumer revenue and 19.6 cents out of every dollar of investor's income. The ratio of taxes paid to gross revenue from domestic service grew from 4 per cent in 1912 to 33 per cent in 1929.

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Third Unit to Be Added At San Francisquito

Completion of plans and specifications for the third unit of Power Plant No. 2 in San Francisquito Canyon has been announced to the Los Angeles Board of Water and Power Commissioners by H. A. Van Norman, general manager and chief engineer of the Department of Water and Power. The addition of the third unit will add 18,000 hp. of generation capacity to the more than 40,000 hp. now operating in the plant, Mr. Van Norman pointed out.

"The conditioning of the tunnels between Power Plants Nos. 1 and 2 to deliver the increased supply of water required for this unit is well under way and it is expected that this work will be completed in time to be available for use when the penstock and power plant machinery are installed," said Mr. Van Norman.

Provision for all of these additions was made in the 1931-32 electric system budget of the Department of Water and Power. The cost of the betterments is estimated at approximately $1 million.

"This marks one of the major improvements to the city's power system thus far contemplated and is in line with the policy of the Board of Water and Power Commissioners to increase to its fullest extent the generating capacity consistent with the additional water coming through the aqueduct," General Manager Van Norman added.

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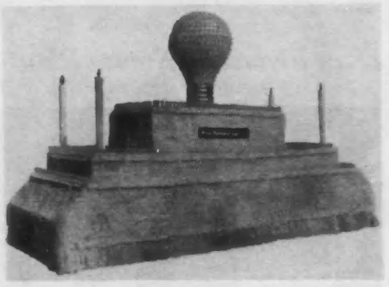
Prize Winning Float



THIS float won second prize for the Utah Power & Light Co. when displayed in a "Covered Wagon Days" celebration held in Salt Lake City July 24-26 in commemoration of Utah's pioneers. The float was designed entirely by employees of the company. Over-all dimensions were 18 ft. 9 in. long by 13 ft. 6 in. wide. The large globe on top was 6 ft. high, and 1,800 smaller globes were used to surround the three tiers of the float.

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LANE COUNTY, ORE., UTILITY DISTRICT SOUGHT—The Oregon Hydro-Electric Commission has received a preliminary petition for the creation of a utility district in territory located in the extreme western portion of Lane County. Under the terms of the initial articles the proposed project will consist of hydro-electric plants constructed along Lake Creek, a tributary of Triangle Lake, and the power generated is to be marketed throughout the contemplated district. The project will be known officially as the "Triangle Lake Utility District." The petition, however, has been submitted to the state attorney general for examination as to its legal form, and will not be accepted for formal entry in the records of the commission until its legality has been definitely established. The Triangle Lake territory consists largely of sparsely settled lands used principally for recreational purposes and lumbering operations.

WATER RIGHTS acquired for power development purposes in Oregon cannot be utilized for other uses if by such uses the existing rights of others are injured, according to a decision of the state engineer. The opinion was rendered in the matter of the application of the North Powder Milling and Mercantile Co., of North Powder, for authority to use its 25 sec.ft. of water from the North Powder River, originally acquired for power development, to irrigate 1,837 acres of land.

Coal Operator Given Power Sale Permit

The Colorado Public Utilities Commission has granted a conditional permit to the Oliver Power Co. to furnish electric light and power to Rogers Mesa and vicinity, in Delta County.

Permission to operate in the designated territory was conditional on the Oliver Power Co. purchasing the Gunnison Valley Power Co. at a price agreeable to the latter concern. Should the Grand Valley company refuse a "reasonable offer," as fixed by a board of three arbitrators, then the Oliver Power Co. may proceed immediately on construction of the necessary transmission line from its present terminus to Rogers Mesa, at a cost of approximately $13,000.

Previously, the Oliver organization, coal operators whose power generating plant furnishes electricity in excess of mining requirements, had petitioned to enlarge its scope of operations; to this the Gunnison Valley Power Co. objected. Investigation by the utilities commission determined that the Oliver company was in better position to supply Rogers Mesa, where fruit growers are eager for current to power their apple-washing machines. Attempts by the favored organization to purchase its rival were unsatisfactory, resulting in the commission's issuance of the conditional permit.

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VERNON, CALIF., BUYS DIESEL EQUIPMENT FOR MUNICIPAL PLANT—The city of Vernon, Calif., on July 17 awarded a contract for five diesel engine electric generating units of 6,000-kw. capacity each to the Hooven, Owens, Rentschler Co., of Hamilton, Ohio. The amount of the contract was $1,500,000, according to the Vernon city clerk. First of the five units will be delivered to the city in eight months, and delivery of the remaining units will be made one each month. A bond issue for the construction of a municipal power plant was voted by Vernon citizens in September, 1930. Vernon is an industrial community adjacent to and almost wholly surrounded by the city of Los Angeles.

SAN DIEGO STUDYING STREET LIGHTING COSTS—Lester S. Ready, consulting engineer of San Francisco, and formerly chief engineer of the California Railroad Commission, has been employed by the city council of San Diego, Calif., with instructions to investigate a proposition made by Fairbanks-Morse Co. to install a diesel electric municipal plant for downtown street lighting and also to investigate the possibilities of bringing natural gas to the city. Mr. Ready is also to make a general report on the costs of utility service to the people of San Diego. The street lighting district in question is now being served by the San Diego Consolidated Gas & Electric Co., which also is to make a report on the possibility of serving the community with natural gas.

Railroad Passenger Tracks Floodlighted

Floodlighting of the passenger yards at El Paso (Tex.) Union Station has been completed, the installation consisting of five railroad floodlights placed upon three towers 90 ft. high installed at advantageous locations in the yards.

The lights have been so placed as to light adequately all loading platforms and the adjacent tracks. More uniform lighting is provided, and the new installation has eliminated all shadows made by trains standing upon the yard tracks. The new lights replace the local luminaires formerly used in the center of each platform. All of the old equipment has been removed, giving the yards a more pleasing appearance besides providing greater space.

At present only 6-kw. floodlights have been installed, but railroad officials are highly pleased with results and it is planned to add three large floodlights in the near future, increasing the installation to 9-kw. L. J. Last, illuminating engineer, El Paso Electric Co., worked on this novel layout in connection with General Electric and Westinghouse engineers.

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Uintah River Basin Project Authorized

The Federal Power Commission has authorized a license to the Uintah Power & Light Co. for power development on the Uintah River in eastern Utah. This action not only settles the status of the original unit constructed in 1920, but makes possible the extension of the project and enlargement of the power plant.

The figures of net investment and accrued depreciation on the original plant now have the approval of both federal and state commissions. The project is wholly on lands under federal control, the larger part of tribal lands of the Uintah Indians and the remainder in the Ashley National Forest. The annual payment to the Indians will be computed on the basis of generated power with an annual minimum charge of $100.

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P. G. AND E. Co. PROTESTS "EXCISE" TAX—Asserting that a section of the California Political Code under which incorporation fees are graduated according to capitalization is unconstitutional, the Pacific Gas and Electric Co., San Francisco, has filed suit in the State Supreme Court asking for a writ of mandate. The company seeks to compel Frank C. Jordan, secretary of state, to accept and file a certificate extending the company's corporate existence to April 10, 1981, for a fee of $5. The power company states it was incorporated in 1905 for a period of 50 years. Last April the directors were authorized to extend the incorporation period to 1981. Upon presenting the papers for filing and offering $5 in payment, the secretary of state refused to accept either the papers or the fee, claiming under the code a payment of $40,000, based on a rate of $100 for each million dollars of the $400 million capitalization. The company in its petition sets forth that the code section in question is unconstitutional in that it in reality imposes an excise tax.

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San Francisco Steam Plant

Station A of the Pacific Gas and Electric Co. broadcasts the company's name in neon every night from its stack

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Report Made of Termite Study

There apparently is no way of eliminating termites completely, or even of reducing their numbers below a point of economic significance, according to the Termite Investigations Committee, an organization sponsored by leading California producers and users of lumber in cooperation with the University of California. The committee has just concluded a 3-yr. survey of termites and of methods of preventing or controlling the millions of dollars' annual damage done by them.

While there seems to be no feasible way of eliminating the termite pest completely, or even of reducing their numbers below a point of economic significance, the committee reports that with intelligent application of information made available by its investigation, there is little excuse for any extensive damage.

Complete reports of the committee's findings will be written and placed on file at the University of California libraries in Berkeley and Riverside, and a summary of the report will shortly be published in book form for the benefit of the public. In a general way the report will be an amplification of the facts published in Circular No. 318 of the university's College of Agriculture, under the title "Termites and Termite Damage."

While the present study has had in mind chiefly the damage done to buildings by termites, the findings should be profitable to producers of wood poles for use by utility companies.

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Allis-Chalmers Turbine For Pasadena Plant

Contract for the purchase of a 25,000-kw. steam turbine for the addition now under construction at the Pasadena (Calif.) municipal light and power department plant on Glenarm St., has been awarded to the Allis-Chalmers Co., of Milwaukee, Wis., by the Pasadena city board of directors. The amount of the bid was $397,900. Benjamin F. DeLanty, general manager of the light and power department, announced that the bid includes an oil filtration system, a second auxiliary pump, and a second air cooler and valve gear.

Completion of the addition will increase the capacity of the plant to 60,000 kw., and will increase the number of operating units to eight. Plans of the city now contemplate operation of the new unit either in March of next year or by the middle of next summer.

▼

TRASK RIVER RIGHTS SOUGHT FOR UTILITY DISTRICT—The Oregon Hydroelectric Commission is in receipt of an application for a preliminary permit to appropriate 6,000 sec.-ft. of water from Trask River and to construct three reservoirs of a total capacity of 30,000 acre-ft. for the development of 45,000 hp. The applicants are W. H. Leach, O. A. Schultz and James Williams, all of the city of Tillamook, who state that the development is for a utility district for which a preliminary permit is being circulated. The district is to comprise virtually the entire county.

News Shorts

¶ INDEX (WASH.,) power plant, recently aquired by the Puget Sound Power & Light Co. for $8,250, will be reconstructed at once at a cost of $5,000. The company will also spend $15,000 on a transmission line extension to Tulalip.

¶ VANCOUVER, B. C., opposes the contemplated transfer of Garibaldi Park to the Dominion government without sufficient water rights protection. The city is spending $25,000 to survey the Cheakamas River, which flows through the area, as a potential site for a publicly-owned power plant.

¶ SEATTLE'S BOARD OF PUBLIC WORKS rejected all bids for construction of two 200-ft. steel towers. Low bid was $12,925.

¶ PACIFIC POWER & LIGHT CO. has consolidated the Dayton and Pomeroy (Wash.) districts under the management of L. W. Dick as an economic measure.

¶ CHENEY, WASH., voted a $70,000 bond issue to purchase the privately owned Cheney Light & Power Co. from its owners. The city expects net earnings of $20,000 annually, purchasing its power from the Washington Water Power Co., and will not lower rates until the bonds are retired, Mayor Clarence Martin intimated.

¶ WESTERN POWER, LIGHT AND TELEPHONE CO. will construct a copper feeder circuit from Greeley to Eaton, Colo., to take care of increased power load from rural irrigation. Though the amount to be spent was not indicated, it was announced that free current would be supplied users until a customer had recovered his investment in the additions.

¶ B. C. ELECTRIC CO. will receive no action on its proposal to harness Campbell River near Vancouver until the current governmental inquiry has been concluded. The development would necessitate the raising of Buttle Lake, in the heart of a national park, by a dam, and many organizations have protested that this would ruin the park.

¶ GRAND JUNCTION, COLO., by a 3 to 1 majority, granted Public Service Co. of Colorado a 20-year electric franchise.

¶ MONTANA POWER CO. recently purchased the Granite County Power Co. and immediately cut existing rates in half.

¶ CALIFORNIA'S RAILROAD COMMISSION dismissed for lack of evidence the complaint of the Santa Clara County local of the California Prune Growers League and others against the Pacific Gas and Electric Co., asking for a reduction in agricultural power rates in that county.

¶ TRANSFER OF THE LICENSE for the Rock Island water power project in the Columbia River near Wenatchee, Wash., from the Washington Electric Co., a wholly-owned subsidiary of the Puget Sound Power & Light Co., to the parent company, has been authorized by the Federal Power Commission.

¶ WEST KOOTENAY POWER AND LIGHT CO. has applied for its fifth power site on the Kootenay River, B. C., and expects to develop an additional 30,000-hp. at the site.

¶ THE SOUTHERN SIERRAS POWER CO. will construct a $35,000 transmission line from its Mill Creek power house to Bridgeport, Calif., and vicinity to serve that territory. Amasa S. Bryant, operating a small gas-generated electric plant in Bridgeport, alleged invasion of his territory by the company, but the Railroad Commission dismissed the complaint, finding that he is supplying electricity only from sunset to midnight daily and daylight service on Mondays and Wednesdays.

¶ UNITED STATES SUPREME COURT upheld Pacific Gas and Electric Co. and other power companies in their right to use canals constructed under permit for other purposes across government land when it refused to hear an appeal from a decision in favor of the company. The latter had been using some canals in Butte and Amador counties constructed for mining and irrigation prior to May, 1896, and the government sued for damages.

¶ SIERRA PACIFIC POWER CO., Reno, Nevada, has filed two suits in Carson City's Federal Court: Against the Nevada Tax Commission and D. W. Dunkle, Washoe County treasurer, to obtain a reduction in the taxation valuation of the company's properties; and against five separate counties to contest assessments on intra-county power and water service.

¶ CANADIAN ENGINEERING CO., LTD., Vancouver, B. C., has made an offer of $92,000, good until Sept. 30, 1931, to the Prince George city council for the purchase of the municipally owned electric power plant. Identified with A. C. R. Yuill, head of Canadian Engineering Co., in making the offer for the plant were F. J. B. Bartholomew, president, Electric Power & Equipment Ltd., Vancouver, and F. H. Southin of the same firm. The offer is dependent on a franchise for 25 years being granted, renewable for a like period. Mr. Southin estimated $200,000 as the cost of a hydro system with a first unit of 1,000 hp. and a like amount for a 3,000-hp. addition which must be made to the existing system.

¶ PUGET SOUND POWER & LIGHT CO. is spending $150,000 in improvements and new equipment at its Beverly Park substation. Four 60-ton transformers, each rated 8,333-kva., are being added to the present installation. A new substation is being built at Marysville; some $21,000 will be spent in the district for improvements including an 11-kv. line 11.2 mi. long.

¶ "THIRST," described as "a graphic picturization of man's eternal combat with the desert of southern California," is the title of a film prepared for the Metropolitan Water District of Southern California, and now being shown in theaters in that territory.

¶ UNIVERSAL ALASKAN CORP., a mining firm of Baker, Ore., has filed an application with the state engineer for a permit to appropriate 122 sec.-ft. of water from East Eagle Creek, a tributary of Powder River, for the development of 500 hp. in Baker County. This is the first power development application to be filed since the enactment of the state's new water conservation act by the 1931 Legislature.

¶ THE CALIFORNIA OREGON POWER CO. has completed a transmission line from Medford to Kerby and is constructing one from Fort Klamath through Crater Lake National Park.

P. C. E. A.

Engineers Announce Plans For First Meeting

The Engineering Section, P. C. E. A., will hold its first group meeting of the association year Sept. 16-18 at the Clift Hotel, San Francisco.

Accident prevention, electrical apparatus and foreign systems coordination committees will convene from 10 a.m. to 2 p.m. Wednesday, Sept. 16; hydraulic power and overhead systems committees from 9:30 a.m. to 2 p.m. Thursday, Sept. 17; and the meters, prime movers and underground systems committees from 9:30 a.m. to 2 p.m. Friday, Sept. 18.

All members of the executive committee and all committee chairmen are invited to attend a dinner meeting at 6 p.m. Wednesday. The regular general luncheon for all members of the section will be held at 12:15 p.m. Thursday, in the main dining room of the hotel. Committee chairmen will briefly outline their plans for the year and Dr. Harris J. Ryan, professor emeritus of electrical engineering at Stanford University, will address the meeting.

Under the auspices of the accident prevention committee, a mass meeting for all utility supervising employees in the Bay area will be held at the Clift Hotel Thursday evening from 8 to 9 o'clock.

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W. C. MULLENDORE HEADS PUBLIC RELATIONS SECTION—A M. Frost, manager of agricultural power sales, Pacific Gas and Electric Co., has tendered his resignation as chairman of the Public Relations Section, P.C.E.A. W. C. Mullendore, vice-president, Southern California Edison Co. Ltd., has been appointed by A. B. Day, president of the association, to succeed Mr. Frost as chairman of the section. Mr. Mullendore is also chairman of the Public Policy Committee. Mr. Frost will serve as vice-chairman of the Public Relations Section.

WOMEN'S COMMITTEES of both the Pacific Coast Electrical Assn. and the Pacific Coast Gas Assn. will have a common chairman this year, it is announced. Miss Clarita Scott, of the Los Angeles Gas and Electric Corp., has assumed the dual chairmanship. A luncheon conference of the joint committee has been set for Wednesday, Sept. 2, at the Whitcomb Hotel, San Francisco, during the convention in that city of the Pacific Coast Gas Assn.

DR. R. E. NYSWANDER
Denver

R. J. DAVIDSON
Portland

A. I. E. E.

1931-32 Officers Are Installed

OFFICIALS and executive committee members of the eight Pacific Coast Sections of the American Institue of Electrical Engineers took office for the current administrative year on Aug. 1. They are as follows:

San Francisco Section: Chairman, E. A. Crellin, Pacific Gas and Electric Co.; vice-chairman, E. F. Maryatt, Pacific Gas and Electric Co.; secretary, W. C. Smith, General Electric Co.; executive committee, C. A. Andrews, Westinghouse company; W. P. Bear, P. G. and E. Co.; L. A. Gary, The Pacific Telephone and Telegraph Co.; P. J. Ost, city engineer; P. B. Garrett, Westinghouse company.

Los Angeles Section: Chairman, P. S. Biegler, University of Southern California; secretary, F. E. Dellinger, Los Angeles Gas and Electric Corp.; assistant secretary, A. P. Hill, Electrical Research Products Inc.; executive committee, Fred Garrison, General Electric Co.; O. W. Holden, Bureau of Power & Light; R. H. Halpenny, The Southern Sierras Power Co.; E. K. Sadler, Kelman Electric & Mfg. Co.

Seattle: Chairman, M. T. Crawford, Puget Sound Power & Light Co.; vice-chairman, A. F. Darland, City of Tacoma Municipal Light & Power Plant; secretary-treasurer, C. B. Carpenter, The Pacific Telephone & Telegraph Co.; executive committee, C. E. Carey, Westinghouse company; C. R. Wallis, General Electric Co.; G. E. Quinan, Puget Sound Power & Light Co.; C. E. Rogers, The Pacific Telephone and Telegraph Co.

Portland Section: Chairman, R. J. Davidson, Pacific Power & Light Co.; secretary-treasurer, F. M. Lewis, Northwestern Electric Co.; executive committee, L. R. Elder, General Electric Co.; Berkeley Snow, ELECTRICAL WEST; W. Brenton, Portland General Electric Co.; V. B. Wilfley, Westinghouse company.

Spokane Section: Chairman, H. L. Vincent, General Electirc Co.; vice-chairman, C. F. Norberg, The Washington Water Power Co.; secretary-treasurer, W. M. Allen, Home Telephone & Telegraph Co.; executive committee, L. R. Gamble, The Washington Water Power Co.; H. B. Tinling, Tinling and Powell Co.; H. J. Storms, Western Union Telegraph Co.

Denver Section: Chairman, Dr. R. E. Nyswander, Universtity of Denver; vice-chairman, W. D. Hardaway, Publice Service Co. of Colorado; secretary-treasurer, N. R. Love, Denver Tramway Corp.; executive committee, R. B. Bonney, Mountain States Telephone & Telegraph Co.; W. H. Bullock, Westinghouse company.

Utah Section: Chairman, Paul Ransom, Utah Apex Mining Co.; secretary-treasurer, A. L. Taylor, Universtiy of Utah; executive committee, J. H. Belt, General Electric Co.; W. M. Scott, Utah Power & Light Co.; E. L. Morris, Westinghouse company; H. B. Waters, Telluride Power Co.

Vancouver Section: Chairman, G. R. Wright, Canadian General Electric Co.; secretary, C. Arnott, B. C. Electric Railway Co., Ltd.; executive committee, Dr. H. Vickers, University of British Columbia; F. J. Bartholomew, Electric Power Equipment, Ltd.; L. B. Stacey, Packard Electric Co.

Convention to Be Reported Next Month

Falling too late in the month to be reported in this issue of ELECTRICAL WEST, the A.I.E.E. convention at Lake Tahoe, Aug. 25-28, will be given a full account in the Oct. 1 number by a member of the staff of this publication who will be in attendance.

P. S. BIEGLER
Los Angeles

E. A. CRELLIN
San Francisco

M. T. CRAWFORD
Seattle

G. R. WRIGHT
Vancouver

PAUL RANSOM
Utah Section

H. L. VINCENT
Spokane

Financial

Large Gain Shown in P. G. and E. Co. Income

Following is a statement of the Pacific Gas and Electric Co.'s consolidated income account for the six months ended June 30, 1931, compared with the same period of 1930. For purposes of comparison, the operations of all companies now in the consolidated system were included for both periods covered by this statement.

	6 Mos. to June 30, 1931	Comparison With First Half of 1930 Increase or *Decrease
Gross revenue, including miscellaneous income	$43,707,243	$466,515
Maintenance, operating expenses, taxes, (including federal taxes, and reserves for casualties and uncollectable accounts	18,765,696	190,980*
Net income	$24,941,547	$657,495
Bond interest and discount	7,566,324	149,775
Balance	$17,375,223	$507,720
Reserve for depreciation	5,418,837	282,492
Balance	$11,956,386	$225,228
Dividends accrued on preferred stock	3,971,217	184,301
Balance	$ 7,985,169	$ 40,927
Dividends accrued on common stock	5,975,817	331,877
Balance	$2,009,352	$290,950*

The balance of $7,985,196 available for dividends on the company's common stock was equivalent to $1.34 per share upon the average of 5,975,817 shares of common outstanding during the first half of 1931. This compares with earnings of $1.41 per share upon an average of 5,643,940 common shares outstanding in the six months ended June 30, 1930, assuming that the common stock issued in exchange for the California subsidiaries of the North American Co., which were acquired on June 9, 1930, had been outstanding for the full semi-annual period.

Sales of electric energy on the entire system were 1,593,337,678 kw.-hr., a gain of 30,087,829 kw.-hr., or 1.92%.

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7-Million Kw.-hr. Gain Reported by Edison Co.

Sales of electric energy by the Southern California Edison Co. Ltd., for the first six months of this year totaled more than 1,210,000,000 kw.-hr., an increase of more than 7 million kw.-hr. over the corresponding period of 1930, according to a recent announcement of R. H. Ballard, president. The figures show that there were 1,210,702,650 kw.-hr. sold during the first six months, compared with 1,202,761,501 kw.-hr. sold the first six months a year ago, an increase of 7,941,149 kw.hr.

"Growth of the company's domestic load was an outstanding factor in the sales increase of 7 million kw.-hr.," Mr. Ballard said. "Sales to domestic consumers for the six months totaled 216,370,096 kw.-hr. This was an increase of 13,165,153 kw.-hr., or 6 per cent over the total of 203,204,943 kw.-hr. sold from Jan. 1 to June 30, 1930.

"The company's record of average annual domestic consumption has reached 703 kw.-hr. per consumer per year, one of the highest averages recorded in the country.

"Use of electric energy for industrial power purposes on lines of the Edison company for the first six months of this year was ten per cent off from the corresponding period of 1930. The electric light and power business of southern California has been looked upon for many years as a reliable barometer of business conditions. It is particularly significant, therefore, when our records of industrial power use evidence the fact that Southern California has been within ten per cent of its 1930 rate of industrial activity.

"The Edison company at the close of the first six months of the year was serving 474,484 retail consumers," Mr. Ballard said. "This is a gain of 17,821 consumers in the last twelve months.

Gross earnings of the company for the half-year ended June 30, 1931, amounted to $19,677,290 compared with $19,394,435 for the same period last year, an increase of $282,855, or two per cent. Net earnings for the six months, after deducting operating expenses and taxes, were $12,499,812 compared with $12,201,715 for the same period last year, an increase of $298,097 or two per cent. The amount remaining for dividends and depreciation after fixed charges was $8,994,781 for the six months period compared with $8,714,870 last year, an increase of $279,911 or three per cent.

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Refinancing Proposed For Irrigation District

A 5-yr. refinancing plan which places economic risk of decreased power revenue in drought years upon bond holders instead of tax payers has been submitted by the Merced (Calif.) Irrigation District Bond Holders' Protective Committee and approved by the board of directors of the district.

The Bond Holders' Protective Committee was appointed following the failure of interest payment on bonds of the district July 1 in the amount of $477,000. Under the proposed plan this interest will be paid in full to holders of the bonds. Deficiency in revenue from by-product hydro-electric power caused by the water shortage was the immediate cause of default in payment.

The plan has yet to be approved by the bond holders and must be ratified by the taxpayers in the district before it becomes effective. Its essential feature is a reduction in the minimum bond interest rate to zero for the year 1931-32, with a 1 per cent rate the following year, an increase on a sliding scale to 2½ per cent for the fifth year, and thereafter a return to a 5½ and 6 per cent rate, according to the nature of the bonds. Additional interest to the bondholders during the 5-yr. readjustment period, but not guaranteed by the district as the sliding scale rate is, will be possible only from excess power revenue.

Reduction in bond interest, as proposed, permits a reduction in tax rates of almost 50 per cent for the first year, with a gradual increase throughout the 5-yr. period.

The plan provides for an operating expense fund of $100,000 to be taken from the first year's revenue. For the following four years part of the power revenue will be placed in a reserve fund, the definite amounts being designated in the plan, until a $500,000 reserve fund has been established at the end of the five years. After this time $375,000 will be taken from the power revenue for operating expenses, and then the power revenue will be used to pay off the bonds.

The Nevada Irrigation District, which also failed to meet its July 1 bond interests, has been studying plans for the reorganization of that district. Again the drought caused a shortage in the revenues from power, making the income insufficient to pay the interest and principal on outstanding bonds.

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Seattle City Light Prepares 1932 Budget

During 1932, the Seattle City Light Department will spend $4,352,972 on new construction, according to the preliminary budget of the department now under study by the city council. As submitted, the entire light department budget for 1932 will total $10,994,213 as compared with $8,905,026 for 1931.

The city council adopted a resolution last month authorizing and directing the city comptroller to advertise and offer for sale on September 11, 1931, $4,000,000 Seattle light and power bonds, 1930, authorized by ordinance. On July 10, 1931, the corporate authority opened bids for $2,000,000 of this issue, and rejected all bids on the ground that the price was too low when the price paid for former issues of a

similar character was considered. Since that time extension work has been carried on with money borrowed from other funds, and the new call is for double the amount of the bonds.

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L. A. Power Bond Interest To Be Paid in Advance

For the first time in the history of the Department of Water and Power, its power bond interest and redemption charges will be paid in advance. The Board of Water and Power Commissioners late in July authorized advance payment of $3,000,000 for power bond charges in 1931-32.

Interest earnings of $40,000 will accrue by making the advance payment instead of periodically, as heretofore, it was pointed out by Arthur Strasburger, president of the Water and Power Commission.

Mr. Strasburger pointed out that the money now is on hand and not earning interest for the department and indicated that after the $3,000,000 payment, the department will have $2,000,000 in cash still on hand and accumulating at the rate of $600,000 a month. It will be credited to this sum.

"We have ample money to meet all budget requirements for the coming year," he added. "It is significant that the department through its unified management is able so to conduct its affairs that it may accumulate this sum of money in spite of dispirited business conditions generally."

Meetings

Renewed Activity Is Shown by Leagues

Camp Co-operation XI, the tenth annual conference of electrical leagues, held July 27-31 at Association Island, Henderson Harbor, N.Y., under the auspices of the League Council and The Society for Electrical Development, Inc., brought evidence of renewed interest in league activity throughout the country. Particularly did the meeting reflect a definite trend toward broader fields of merchandising and greater responsibility of leadership in the matter of unification of local interests.

Agitation now rife in many states against utility merchandising was shown to have thrown responsibility upon the leagues for a restoration of amicable public relations.

Among the most constructive meetings at the camp was an informal caucus of a joint industry committee composed of representatives from six national associations whose aim it is to coordinate the electrical industry's residential wiring specifications.

The conference was an outgrowth of the Red Seal advisory committee and was called to hear a report by E. A. Brand, chairman, wiring sales committee, N.E.L.A. A general agreement was reached to the effect that the several associations now perparing wiring specifications withhold premature publication of these specifications and that a joint committee be formed toward the end that an acceptable and uniform specification may be adopted for the industry as a whole.

J. J. Caddigan, treasurer of the Metropolitan Electrical League of Boston, was elected as chairman of the League Council, succeeding G. W. Weston, manager, The Electric and Radio Association of Kansas City.

R. F. Steffens of Chicago was elected vice-chairman of the Council and O. C. Small, of the Society for Electrical Development, secretary.

Coming Events

International Association of Electrical Inspectors, Northwest Section—Sixth annual convention at Salem, Ore., Oct. 5-7, 1931.

Southwest Section—Annual convention at San Francisco, Sept. 28-Oct. 1, 1931.

National Electric Light Association—Annual convention and exhibit, Atlantic City, N. J., June 6-10, 1932.

Rocky Mountain Division — Annual convention at Stanley Hotel, Estes Park, Colo., Sept. 2-4, 1931.

National Electrical Wholesalers Association, Pacific Division—Thrice yearly meeting, Hotel Del Monte, Del Monte, Calif., Oct. 8-10, 1931.

Pacific Coast Electrical Assn.—Commercial Section meeting, Los Angeles, Oct. 15-16, 1931.

Engineering Section meeting, Clift Hotel, San Francisco, Sept. 16-18, 1931.

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Salt Lake Industry Members Hold Outing

Featured by an exceptionally large attendance and a program of sports which was of outstanding interest, the annual outing of the members of the electrical industry of Salt Lake City and adjacent territory was held at Lagoon, Utah, Thursday Aug. 6. Lagoon is a summer resort about 15 mi. north of Salt Lake City. The outing was sponsored by the Electrical League of Utah.

The program consisted principally of athletic events designated by various electrical terms, the winners receiving prizes consisting mainly of electrical appliances. A dinner, entertainment and prize drawing for additional electrical prizes was held at 6:30 p.m. followed by dancing in the evening.

Leo Brandenberger was general chairman for the outing, and he was assisted by a number of special committees.

Public Ownership League To Meet in Los Angeles

Leaders in the public ownership movement from all parts of the United States will gather at Los Angeles Sept. 28 for a three-day convention of the Public Ownership League of America.

Among those who are expected to be in attendance are U.S. Senators George W. Norris of Nebraska and Hiram W. Johnson of California; Carl D. Thompson, Chicago, editor and publisher of *Public Ownership Magazine;* J. D. Ross, superintendent, Seattle City Light Department; Kenneth Harlan, Portland; E. F. Scattergood, chief electrical engineer of the Los Angeles Department of Water and Power; Louis Bartlett, San Francisco; Homer T. Bone, Tacoma; F. P. Wood, Denver; and many others from the Middle West and East.

It is the hope of those in charge of the convention to bring the power issue to the foreground of public consciousness and to focus the attention of political parties on the subject to the end that public ownership planks will be written into both Democratic and Republican platforms next summer. The delegates will hear addresses on the power projects connected with Muscle Shoals, St. Lawrence River, Ontario and Hoover Dam. The question of changing the law so that bond issues for the financing of public utilities may pass with a majority instead of a two-thirds vote will also be raised.

Trips have been scheduled to Hoover Dam and to the Los Angeles city aqueduct and power plants in Owens Valley.

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OFFICERS OF THE VANCOUVER ELECTRIC CLUB, Vancouver, B.C., were recently elected to serve for the ensuing year as follows: President, E. W. Johnson, Canadian Wire & Cable Co.; vice-president, G. N. Wright, general manager, Vancouver branch, Canadian General Electric Co.; secretary, R. S. Smith, Northern Electric Co.; treasurer, H. S. Darroch, Canadian G.E. Co. The following nine directors also were appointed: S. H. Dinsmore, traffic superintendent, B.C. Electric Railway Co.; N. A. Elger, Canadian G.E. Co.; A. C. W. Gage, purchasing agent, B.C. Electric Railway Co.; G. H. Gardner, merchandising manager, Canadian Westinghouse Co.; N. Hall, illumination engineer, B.C. Electric Railway Co.; R. H. Hedley, manager, Neon Products of Western Canada; G. Knowles, manager, Independent Sales & Engineering Co. Ltd.; B. W. Markham, Northern Electric Co.; and L. B. Stacey, manager, Packard Transformer Co. Ltd.

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N.E.L.A. CHOOSES ATLANTIC CITY FOR CONVENTION—Atlantic City, N.J., has been chosen at the convention city for the exhibit and 55th convention of the National Electric Light Assn., to be held June 6-10, 1932.

Personals

A. W. Copley Honored By Institute

A. W. COPLEY, engineering manager of the Pacific Coast District, Westinghouse Electric & Mfg. Co., who took office on Aug. 1 as vice-president of the American Institute of Electrical Engineers for the eighth geographical district, is a Fellow of the Institute and has served on its transmission and distribution committee, telegraphy and telephony committee and the wave form subcommittee of its standards committee.

Mr. Copley's work on the Pacific Coast since his transfer to this territory in 1921 has been largely concerned with power generation, transmission and distribution. Since his graduation from the University of Kansas in 1903 he has been continuously employed by the Westinghouse company, beginning as an engineering apprentice and later successively holding positions in the experimental laboratory, in the railway engineering, supply engineering, industrial engineering and the general engineering departments, as general engineer for the Pacific Coast, as manager of the engineering division of the San Francisco office, and as engineering manager for the Pacific Coast District, his present position.

During the years 1905-08, while employed in the Westinghouse railway engineering department, Mr. Copley carried on pioneer investigations in inductive interference between a.c. railway and communication circuits, principally on the single-phase electrification of the New York, New Haven and Hartford R.R., and later on the Pennsylvania R.R. in the electrification at Philadelphia. His design work during the years 1908-13 on meters, relays, regulators and instruments resulted in developments which persist in present design.

Mr. Copley was a member of the executive committee, San Francisco Section, A.I.E.E., in 1924-26. He has been a member of the inductive coordination and electrical apparatus committees of the N.E.L.A., and of several committees of the P.C.E.A. He is a member of the Army Ordnance Assn. and of the advisory committee on relays and protective devices of the U.S. War Department Signal Corps. Mr. Copley served as general convention chairman of the A.I.E.E. Pacific Coast convention held last month at Lake Tahoe, Calif.

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T. G. SUPPLEE, formerly utility contact representative of the Frigidaire Corp. on the Pacific Coast, with headquarters in Oakland, Calif., has been transferred to the company's factory at Dayton, Ohio.

A. W. COPLEY

WM. F. RABER

E. J. WALLIS

W. F. Raber Long In Utility Field

WILLIAM F. RABER, whose promotion to the presidency of the San Diego Consolidated Gas & Electric Co. was announced last month in ELECTRICAL WEST, has devoted practically his entire life to the utility business.

Before coming to San Diego, Mr. Raber had been general manager for thirteen years of the Southern Colorado Power Co., Pueblo, Colo., another Byllesby property. Born in Ohio in 1871, he began his career with the Central Union Telephone Co. of Ohio in 1891, removing to Mansfield, Ohio, the following year, and in two years became general manager of the Mansfield Railway, Light and Power Co. He left this position in 1905 to become general manager of the Enid (Okla.) Electric Light & Power Co., and a year later was made general manager of the Ottumwa (Iowa) Railway, Light & Power Co. In 1911 he became vice-president and general manager of the Arkansas Valley Railway, Light & Power Co., now the Southern Colorado Power Co.

Commenting on Mr. Raber's election to the presidency of the San Diego company, John J. O'Brien, president, Standard Gas and Electric Co., Chicago, said: "Mr. Raber's election as president of San Diego Consolidated Gas & Electric Co. pleases me very much. This mark of recognition is most assuredly due him as a result of his many achievements in the utility industry as a whole and in the San Diego Consolidated Gas and Electric Company in particular."

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O. T. JOHNSON, JR., member of the Los Angeles Board of Water and Power Commissioners since May 23, 1930, submitted his resignation to Mayor John C. Porter on July 21, to become effective immediately. Mr. Johnson offered no reason for his resignation. At the time of his appointment to the commission he was a member of the board of directors of the Metropolitan Water District of Southern California. He resigned from the district board to accept the appointment of Mayor Porter to the municipal water and power board.

Celebrates Thirty-five Years of Service

E. J. Wallis, since 1916 Pacific District manager for the Graybar Electric Co. and its parent company, the Western Electric Co., on July 6 last celebrated the completion of 35 years in service with the Western Electric Co. and the Graybar Electric Co.

Following his graduation from the University of Rochester in 1896, Mr. Wallis joined the employ of the Western Electric Co. in New York. In 1898 he was made chief clerk with headquarters in Chicago, and four years later was transferred back to New York as chief clerk. In 1906 he became traveling clerical inspector of branch houses, and in that capacity visited San Francisco shortly after the earthquake and fire which occurred in April of that year. Ten years later he returned to that city as Pacific District manager.

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WALTER S. MOODY, of Pittsfield, Mass., after 43 years given to transformer design and production for the General Electric Co., retired July 1 from active engineering work. Mr. Moody had charge of the original department of transformer design and production of the Thomson-Huston Electric Co., at Lynn, Mass., and subsequently, with the formation of the General Electric Co., he was placed in charge of all new divisions formed to carry out such work, including the Oakland (Calif.) works of General Electric. He will retain his connection with the company for consulting purposes.

DAVID SHORE, who has been operating superintendent at the Condit hydroelectric plant of the Northwestern Electric Co., Portland, on the White Salmon River since that plant was put in operation in 1913, has been appointed superintendent of the new Ariel plant of the company on the Lewis River, the first unit of which is to go into operation about Sept. 1. Carl Twidwell, for many years an operator at the Condit plant, has been named superintendent there to succeed Mr. Shore.

A. W. LEONARD, chairman of the board of directors of the Puget Sound Power & Light Co., has resigned both positions. At the same time President J. F. McLaughlin announced that the position of chairman of the board had been abolished. Bayard F. Pope and Charles B. Barnes also resigned as directors. W. H. McGrath, vice-president, has been elected a director to succeed Mr. Leonard, and F. W. Brownell, comptroller, and F. E. Holman were named to fill the two other vacancies. Mr. Leonard retired from the presidency of the Puget Sound company April 1, 1931, to become chairman of the board with headquarters in New York City.

WILLIAM R. L'HOMMEDIEU, of Oakland, Calif., son of W. P. L'Hommedieu, San Francisco manager, Westinghouse Electric & Mfg. Co., has been awarded a 1931 War Memorial scholarship by the Westinghouse company. The award consists of $2,000 and will be used to defray Mr. L'Hommedieu's expenses at the University of California where he is studying mechanical engineering.

L. M. CARGO, Mountain States representative of the Westinghouse Electric & Mfg. Co., Denver, was elected to membership in the League Council at the annual conference of electrical league managers held July 27-31 at Association Island, N.Y. Mr. Cargo is president of the Electrical League of Colorado.

D. C. GREEN, vice-president, Electric Bond & Share Co., New York, made a tour of the company's properties in the Pacific Northwest in August. His itinerary included Salt Lake City, Portland, Spokane, Butte and Boise. Mr. Green was formerly vice-president and general manager of the Utah Power & Light Co.

H. J. FLAGG, for the past seven years assistant to the general manager of the Grays Harbor Railway & Light Co., Aberdeen, Wash., has severed his connection with that company to take up a new position with the parent company, the Federal Light & Traction Co., New York. His primary task will be that of increasing the load on Federal Light & Traction properties.

F. W. LINKLATER, advertising manager for the Grays Harbor Railway & Light Co., Aberdeen, Wash., served as publicity director for a celebration held at Kalalock, Wash., Aug. 26-27 and sponsored by the Olympic Development League to mark the completion of the Olympic Highway Loop.

J. M. MELDRAM has been appointed manager of the Pacific Division of the Canadian National Carbon Co., embracing the territories of British Columbia and Alberta. Mr. Meldram has been associated with the National Carbon Co. in various parts of Canada for the past ten years.

MARCEL GARSAUD, Federal Power Commission member, has been on an inspection tour of Western power projects during the past month. Arriving in the Northwest, Col. Garsaud visited the Flathead project in Montana, the "Z" Canyon project near Spokane, the Kettle Falls project of The Washington Water Power Co., the Rock Island dam of the Puget Sound Power & Light Co., the Priest Rapids project and several smaller developments. Proceeding into Oregon Col. Garsaud inspected the Ariel project of the Inland Power & Light Co. Motoring south from Portland, the commissioner included in his itinerary the Pit, Feather, Yuba, Mokelumne, San Joaquin, Kings and Kern River plants, and the Lake Almanor development of the Great Western Power Co. Col. Garsaud will visit the Hoover Dam site before his return to Washington.

WILLIAM HAECKEL has been elected president of the Los Angeles Gas and Electric Corp.'s employees' association. Other officers elected are C. E. Bates, vice-president, and Arthur Maltitz, treasurer.

E. C. WILSON, until recently a salesman for the Great Western Power Co. in Oakland, Calif., is acting as Alameda County agent for the Stop-Fire extinguisher and has opened offices in the Richfield Oil Bldg., Oakland. Mr. Wilson had been associated with the Great Western company for 20 years.

E. E. ACKLAND recently arrived in Vancouver, B.C., to take charge of the lighting service department of the Vancouver branch of the Canadian General Electric Co. Mr. Ackland has undergone a special training in the General Electric laboratories in Schenectady, N.Y., and has occupied posts in Chicago, Cleveland, Pittsburgh, and Toronto.

E. B. CRIDDLE AND GEORGE M. WILLS, respectively vice-president and general agent, and general superintendent of The Southern Sierras Power Co., Riverside, Calif., were recently awarded 20-yr. service buttons for their association for that period with the power company.

JOHN B. MILLER, chairman of the board of directors of the Southern California Edison Co., Los Angeles, is cruising along the British Columbia coast in his steam launch *Sobre Las Olas* and will extend his trip into Alaskan waters. This is the third successive year that Mr. Miller has cruised in the North Pacific.

A. F. HOCKENBEAMER, president of the Pacific Gas and Electric Co., San Francisco, celebrated the completion of his fourth year in that office on Aug. 16.

WADE S. COOK has been appointed district superintendent for The Southern Sierras Power Co. at Calipatria, Calif. Mr. Cook was formerly in the Coachella office of the company.

E. H. FISHER, sales manager, Pacific Wire Rope Co., Los Angeles, motored to the Northwest recently, visiting points along the coast as far north as Vancouver, B.C.

Obituary

Col. H. V. Carter Is Victim of Heart Attack

HARRY V. CARTER, prominent in Pacific Coast electric circles until his retirement as head of the Pacific States Electric Co. in 1916, died in

COL. H. V. CARTER

Oakland on Monday, Aug. 17. Death came as a result of a sudden heart attack.

Born in Port Colborne, Ont., 74 years ago, "Colonel" Carter, as he was know to his associates, came to Los Angeles in 1887 and organized one of the first electric light and power companies, the United Electric, Gas & Power Co. In 1904 this firm consolidated with the present Southern California Edison Co. Ltd., and Colonel Carter withdrew from the utility field.

He then organized the Pacific Electrical Works in Los Angeles. In 1909 he merged this firm with Sterling Electric Co., of San Francisco, and the Crescent Electric Co., of Oakland, to form the Pacific States Electric Co., now General Electric Supply Corp., which he headed until his retirement from the field in 1916. For two terms, 1913-14, 1914-15, he was chairman of the Pacific Division, National Electric Jobbers Assn., forerunner of the present National Electrical Wholesalers Assn.

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OR LYNN MCKOANE, home economist employed by the San Diego Consolidated Gas and Electric Co., and chairman of that company's women's committee, died in San Diego Aug. 7. Miss McKoane had been associated with the San Diego company since 1929 and prior to that was in the employ of the Northern States Power Co., Fargo, N. D.

Contractor Dealer Inspector

Southwest Inspectors Outline Convention

RALPH W. WILEY, president of the Southwestern Section, International Association of Electrical Inspectors, aided and supported by a large committee of San Francisco electrical men, had completed all preliminary plans for the program and entertainment features of the annual convention of that organization in San Francisco, Sept. 28-30, at the Whitcomb Hotel, as August drew to a close. With the exception only of a few titles of some of the chief addresses to be given, the program itself was practically complete. The plans for the entertainment of the visiting delegates and their wives were also well under way.

RALPH W. WILEY

Heading the list was the entertainment committee chairmaned by Don Ray, P. G. and E. Co., with its subcommittees on transportation, ladies' entertainment, banquet, finance, refreshment, and an inspection trip. For the ladies a luncheon and sightseeing trip is planned for the opening day of the convention. The next day a luncheon and bridge party will be held, with the convention banquet that night. A tour of Station A steam plant of the P. G. and E. Co. for the men will be made that same day.

The following committees were appointed by President Wiley and Chairman Don Ray:

Ladies' Committee: M. A. de Lew, chairman; F. A. Gerhardt, Hugh McBirney and W. A. Cyr.

Transportation: Edward Martin, chairman; Victor W. Hartley and J. P. Murphy.

Banquet: W. A. Cyr, chairman, and V. W. Hartley.

Finance: Al H. Nicoll, chairman; H. A. Arth and Don Ray.

Refreshment: Victor Lemoge, chairman; F. A. Gerhardt and H. A. Arth.

Inspection Trip: R. R. Cowles, chairman; G. E. Kimball and J. O. Dillingham.

Aside from this general entertainment committee, Mr. Wiley appointed a reception committee consisting of R. F. McDonald, Westinghouse Supply Co., chairman, H. J. Newton, National Electric Products Corp., Ralph Peterson, Garnett Young Co., Don Gray, Westinghouse Electric & Manufacturing Co., and Ed Price, Ilg Electric Ventilating Co.

For the program itself a number of speakers of national repute are billed, with a plenteous allotment of time devoted to the real feature of inspectors' conventions, namely the intimate discussion of inspectors' problems, interpretations of the code and the exchange of experiences in practice and administration of ordinances. The program, being worked out by President Wiley and Secretary-Treasurer Claude W. Mitchell, was announced tentatively as follows:

Monday, Sept. 28

Registration, 8:30 to 10:00 a.m.

Morning session, 10 a.m.: Welcome by Mayor Rossi. Response, R. H. Manahan, chief, Department of Electricity, Los Angeles, president A.I.E.I. Roll Call. President's address, Ralph W. Wiley, chief, Department of Electricity, San Francisco. Report of executive committee, H. W. Beecher, chief inspector, Los Angeles. Reports of secretary-treasurer, C. W. Mitchell. Appointment of committees and announcements.

Noon: Luncheon at San Francisco Electrical Development League, Palace Hotel, Arthur Abbott, speaker.

Afternoon session, 2 p.m.: Address, "Four-wire, Alternating-Current Secondary Network Systems," by Roy Cowles, Pacific Gas and Electric Co. Address, title not announced, by Arthur L. Abbott, National Electrical Manufacturing Assn. Discussion of inspectors' problems, conducted by R. H. Manahan.

Tuesday, Sept. 29

Morning session, 9:30 a.m.: Committee reports. Address, title not announced, by A. Penn Denton, N.E.M.A. Address, "Radio Communication With Foreign Countries," by O. B. Blackwell, transmission engineer, American Telephone & Telegraph Co. Address on safety orders, George E. Kimball, electrical engineer, California Industrial Accident Commission. Announcements.

Noon: Luncheon at Sugar Refinery cafeteria and trip of inspection through Station A steam plant.

Afternoon session, 3 p.m.: Address, subject to be announced, by E. M. McLaughlin, electrical inspector, Richmond, Calif. Address, "Code Changes," Victor H. Tousley, field engineer, National Fire Prevention Assn., and secretary, A.I.E.I.

Evening, 7:30: Dinner dance and entertainment, with special features.

Wednesday, Sept. 30

Morning session, 9 a.m.: Address, "Surplus," by William S. Boyd, past president, A.I.E.I., and inspector, Western Underwriters' Assn., Chicago. Address, "Wiring as She Is Spoke," by William A. Cyr, associate editor, ELECTRICAL WEST, chairman wiring sales committee, P.C.E.A. Other addresses to be announced later, and inspectors' discussions.

Afternoon session, 2 p.m.: Inspectors' problems discussion. Report of committees. Unfinished business and new business. Report of nominating committee and election of officers.

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Northern Chapter Calls Special Meeting

President Edward Martin, of the Northern Chapter, California Electragists, has issued a call to all members and contractors in northern California for a special one-day meeting and convention for the purpose of discussing three major subjects pertinent to electrical contracting, Sept. 17, at Oakland. The meeting place at time of going to press had not been definitely selected but was to be announced by the chapter headquarters, 522 Call Bldg., San Francisco.

Estimators' Committees For Year Are Named

Officers and committee heads named by the Estimators' Section of the Los Angeles Electragists were recently announced by President L. H. Ellett, Quality Electric Co., as follows: Officers—L. H. Ellett, Quality Electric Co., president; H. H. Hamm, Hamm-Smith Co., vice-president; M. L. Fish, treasurer; P. A. Schrader, secretary. Executive Board—R. L. Booth, English Electric Co.,; W. L. Hyde, George L. Patterson Co.; P. N. Mactolf, and A. Ogilvie. The committee personnel follows:

Program—H. K. Burdick, chairman, W. N. Williams, W. L. Robar, O. L. Wiemer, H. Hamm and C. L. Bennett.

Estimating—P. N. Mactolf, chairman, W. L. Hyde, H. K. Burdick, A. Ogilvie and J. R. Ball.

Schools—P. A. Shrader, chairman, E. J. Reynolds, Roy Phelan, H. K. Burdick, R. L. Crosby and R. L. Booth.

Architects & Engineering—W. L. Hyde, chairman, R. L. Booth, C. L. Bennett and H. Capps.

Data—P. A. Shrader, chairman, P. N. Mactolf, J. W. Rose, R. J. Hanchett and Maurice Scott.

Ordinance—H. Hamm, chairman, Vic Sayre, P. A. Shrader, H. Capps and R. N. Manahan.

Editorial—P. A. Shrader, chairman, J. W. Rose, vice-chairman, O. L. Wiemer, R. L. Booth, H. G. Ufer, R. L. Crosby, M. L. Fish, F. Short, J. Miller and J. Evans.

Entertainment and Reception—H. Hamm, chairman, Leon Woods, E. J. Chandler, Gene Pineau, Maurice Scott and R. J. Crosby.

Attendance and Membership—M. L. Fish, chairman. C. L. Bennett, Paul Needham and Mr. Hefty.

Arrangement of the programs has been to group them according to the general subjects of illumination, power applications and signal systems for the several months past. In charge of these programs were:

Illumination: W. L. Robar, Los Angeles Gas and Electric Corp., chairman; R. N. Crosby, illuminating engineeer, Los Angeles Gas and Electric Corp.; Maurice Scott, engineer, Department of Water and Power; Paul Needham, engineer, Southern California Edison Co. Ltd.; P. N. Mactolf, electrical contractor.

Power Applications: O. L. Wiemer, inspector, Los Angeles, chairman; R. J. Hanchett, electrical engineer; Frank Short, electrical engineer, Industrial Accident Commission; C. L. Bennett, Newbery Electric Corp.; and Leon Woods, Progressive Electric Co.

Signal Systems: H. Hamm, Hamm-Smith Co., chairman; Vic Sayre, Golden State Electric Co.; J. R. Ball, Foulkes Electric Co.; J. C. Miller, Southern California Telephone Co.; and E. W. Ristow, Southern California Telephone Co.

Spokane Dealer Designs Fixtures

Contract for supplying and installing lighting fixtures in the new Fox Theater Bldg. in Spokane was let to the Brown-Johnston Co. for $7,500 by the National Theater Supply Co., a Fox subsidiary. The contract does not include wiring.

Many novel modernistic effects will be achieved through the plans as outlined by Eric Johnston, president of the local company. In the ceiling of the auditorium will be 57 large stars of imported antique seed glass, gold plated. These stars will be 4 ft. in diameter and will reflect the light. The seed glass will be multi-colored. Long glass tubes will be grouped in combinations representing skyscrapers, using the new 42-in. lamps. Lamps of various colors will be used and the color and intensity will be controlled from the projection booth. In the ceiling of the foyer will be a 20-ft. star similar to the smaller ones in the auditorium. The foyer will also have 9-ft. vertical brackets of bronze, plated with german silver, in which will be set opal-flash plate glass.

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GOLDEN GATE BRIDGE and San Francisco's War Memorial Auditorium and Opera House, two of the construction plums of the bay region, were plucked by the Alta Electric Co. of San Francisco, in recent competition. This company also recently finished the new Ford plant at Richmond, Calif. Work has already started on the opera house, which was designed by Arthur J. Brown and G. Albert Lansburg, architects, with electrical design by Robert L. St. John and mechanical design by Leland and Haley. The bridge project is being held up pending the settlement of some legal questions incident to the bonds.

MARVELOUS MARIN ELECTRICAL DEVELOPMENT LEAGUE, of Marin County, Calif., recently held a joint meeting with the Real Estate Board of Marin County, at which K. I. Dazey, managing director, Pacific Coast Electrical Bureau, was the speaker on behalf of the electrical industry. Ben Johnson, Tamalpias Electric Co., San Anselmo, president of the league, presided jointly with R. A. Carey of the realtors.

FOUR LOS ANGELES FIRMS have recently moved to new addresses in the same city: West States Electric Co. to 4753 South Broadway; Washer Wilson to 1233 South Hope St.; Atkinson Electric Co. to 722 South Fremont St., South Pasadena; and Shippey Electric Co. to 758 West 99th St.

DICKENSON ELECTRIC Co. has changed its name to the Charles Dickenson Co. and has moved to 2062 Broadway, Oakland, from its former Berkeley address.

Starts Home Career

HELEN MIKESELL KISTLER, for many years executive secretary of the Los Angeles Contractors and Dealers Association, has resigned and, as she puts it, "I have decided to end my career and be a modest little housewife from now on. We are building a new home and you can imagine that to be career enough for anybody." Consolidation of the Los Angeles association into the Southern Chapter, California Electragists and other economy measures are involved in the move. Mrs. Kistler, upon her marriage two years ago, predicted that she might eventually give up her association work, with which she has been connected since leaving school, but was urged to remain by those who knew her effectiveness as secretary. She has always been active with the Estimators Section, being its one woman member. The publication of that Section announces, "It is with regret that this section was informed that our "Helen," Miss Mikesell, has severed her connections with the Southern California Electragists' office. This little lady grew up with the organized association movement and gave her support and cooperation to the Estimators Section at all times."

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THE NEWBERY ELECTRIC CORP., of Los Angeles, recently won the "Plaque of Achievement" given by The Miller Co. for making the best sales record in the sale of Duplexalite units during the year. The plaque was individually awarded each month to the district making the largest per cent of quota. The Newbery Electric Corp. won the award for April, May, June, August and September, which gave it the majority and hence the permanent ownership of the plaque.

QUALITY ELECTRIC CO., LTD., motor specialists and industrial electrical contractors, 812 South San Pedro St., Los Angeles, has been appointed the authorized Southern California repair laboratory of the Weston Electrical Instrument Corp., as well as being distributors for Esterline-Angus Graphic Instruments and J. T. Biddle scientific apparatus. A complete testing laboratory and shop for reconditioning such instruments has been set up with Cliff Adams, experienced technician, in charge of the work.

New Law Effective In Partnerships

Partnership agreements drawn and signed in a legally correct manner may not be partnership agreements after all under California's new law effective last month. This seeming anomaly was brought to light by J. F. Collins, state registrar of contractors. The final touch, he explained, to make the partnership legally effective and binding is the recording of the papers with the local county clerk. This is especially true if the name of the firm contains no indication as to the proprietors of the business.

Several cases on record have ended by finding that the supposed partners were not legally partners at all and that no agreement existed in the eyes of the law. In one case, at least, the status of the case was completely altered by this fact and the decision was rendered adversely to the contractors in question.

After filing, the agreement must be published once a week for four weeks in a local newspaper and an affidavit to that effect filed with the county clerk within 30 days after publication completion.

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Abbott Analyses Code Changes

Some 10,000 free copies of an analysis of the current revision of the National Electrical Code will be distributed by the National Electrical Manufacturers Assn. to members of the I.A.E.I., N.E.L.A., A.E.I., N.E.M.A., and International Assn. of Municipal Inspectors. These are being released now.

A. L. Abbott, engineer of the uniform legislative department, N.E.M.A., made the analysis, comparing each changed rule with the corresponding 1930 requirement. The significance of each change is briefly explained.

Additional copies, if ordered promptly, may be had for 10 cents from the association headquarters at 420 Lexington Ave., New York.

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ELECTRIC ENGINEERING LIMITED, 342 West Pender St., Vancouver, B. C., has been awarded contract for installing the electrical wiring in the First Baptist Church, now under construction at Burrard and Nelson Sts.

THE NORWALK ELECTRIC SHOP has been opened at 511 Firestone Blvd., Norwalk, Calif., by J. R. Pinching, formerly associated with Standard Oil Co.'s electrical department. The shop will specialize in oil field wiring and contracting.

SYDNEY DARBOROUGH LTD., 165 West Fourth Ave., Vancouver, B. C., has been awarded contract for the electrical re-wiring of the King Edward High School at Vancouver.

Manufacturer Distributor

Allis-Chalmers Now Owns Boveri and Condit

Announcement is made by the Allis-Chalmers Mfg. Co., of Milwaukee, Wis., of the acquisition of the principal assets of the American Brown Boveri Co., Inc., and the capital stock of Condit Electrical Mfg. Corp., of Boston, Mass. By this purchase Allis-Chalmers secures several new lines of equipment including electric railway apparatus, mercury arc rectifiers, blowers, electric furnaces and oil circuit breakers, which they will continue to manufacture under the supervision of American Brown Boveri engineers.

After completing the manufacture of goods on order at Camden, N. J., the operations now carried on by the American Brown Boveri Co., Inc., will be segregated. Large apparatus departments and work, with substantially the same personnel, will be transferred to the Allis-Chalmers plants at Milwaukee and Pittsburgh, while the remainder will be moved to the plant of the Condit Electrical Mfg. Corp. at Boston. The Allis-Chalmers district and branch sales offices will, in the future, serve as the main outlet for the former American Brown Boveri products. These will be maintained in eight cities in the West, as follows: Denver, Los Angeles, Phoenix, Portland, Salt Lake City, San Francisco, Seattle and Spokane.

Condit Electrical Mfg. Corp. will continue to manufacture its line of oil switches, circuit breakers and other equipment as a separate subsidiary company, with its own selling organization. With few exceptions, the present sales connections of the corporation throughout the United States will be continued.

District offices of the Allis-Chalmers company at Denver, Los Angeles, Phoenix and Salt Lake City will serve also as Condit branch sales offices. The following will retain their connections as Condit distributors on the Pacific Coast: H. B. Squires Co., San Francisco; T. S. Wood, Seattle; Tinling & Powell, Spokane.

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WASHER JUNKING PLAN—A washer trade-in junking plan recently announced by Altorfer Bros. Co., Peoria, Ill., similar to that offered on automobiles by Henry Ford, gives the ABC washer dealer an allowance of $7.50 for destruction of each obsolete electric or gas engine driven washer taken in trade. The dealer is not required to scrap the motor or wringer mechanism, but may sell them, thus recovering $5 to $10 salvage.

Westinghouse Enters Washing Machine Field

Entrance of the Westinghouse Electric & Mfg. Co. into the household electrical washing machine field was launched in August by approval of a contract with Altorfer Bros. Co., Peoria, Ill., which will produce three models for the Westinghouse company.

The Altorfer firm also announced closing of contracts to manufacture new washer models for the Federal Electric Co., and Fairbanks, Morse & Co., of Chicago.

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Ironer Manufacturers in Cooperative Campaign

To induce women to try electric ironers, five Western factories, factory branches and distributors have banded together to form the Electric Ironing Machine Bureau, and have raised funds for advertising.

Grouped in the new cooperative are: Apex Electrical Mfg. Co., of Cleveland, through its Oakland factory, the Johnson Washer Co.; Fred Biven, Conlon Mfg. Co. representative; Meadows Mfg. Co., through its factory branch in San Francisco; Thor Pacific Co., West Coast subsidiary of Electric Household Utilities Corp.; and the San Francisco factory branch of the Syracuse Washing Machine Corp. ("Easy" Washers). Chairman of the Electric Ironing Machine Bureau committee in charge of promotional work is F. S. Fenton, Jr., Syracuse corporation's divisional sales manager.

Initial evidence of the new cooperative's promotional offensive was the first of a series of quarter-page advertisements which made its appearance Aug. 18 in newspapers of Oakland, Calif., in a four-week test campaign. The advertising bears an invitation to housewives to "Come . . . try an electric ironer . . . operate it yourself at Pacific Gas and Electric Co. stores or the store of any dealer displaying the 'Effortless Ironing' emblem of the Bureau." Fine towels of a famous brand are offered to women who will iron a garment with one of the Bureau ironers. Easy installment terms, with a down payment of $5, apply on the ironers during the campaign.

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STONE-RYALS ELECTRIC CO., 445 Natoma St., San Francisco, has appointed the following to handle distribution of its new Stryco electric fan heaters: Westinghouse Supply Co., San Francisco; The Electric Corp., Portland; and The Thompson-Diggs Co., Sacramento, Calif.

E. A. FOSTER LUMBER CO. moved its main office Aug. 15 from 901 White Bldg., Seattle, to the factory, 8685 East Marginal Way, just south of the city limits.

A. G. FARQUHARSON has been placed in charge of sales in British Columbia and Alberta by the Trestrail Corp., Toronto, distributor of Majestic electric refrigerators.

ACCOUNTING MANUAL READY—The committee on uniform accounting of the National Electrical Manufacturers Assn. announces that the sixth edition of the "Uniform Accounting Manual" is now ready for distribution.

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Not Every Mexican Housewife Has One

On their way to supply the demand created by July and August campaigns of Mexican power companies. The shipment was sent by the Ontario (Calif.) works of the Edison General Electric Appliance Co. to the General Electric S.A., of Mexico City, for distribution. A recent survey of business conditions in Mexico shows that there has been a decided increase during the past year in the demand for electrical supplies, particularly irons, fans, percolators, floor lamps, heating and cooking appliances, and electrically operated radio sets

Kelvinator's $20,000 Sales Promotion Plan

REFRESHING in a world bowed down over the state of business is the announcement of Kelvinator's $20,000 prize contest. More than a quarter of a million dollars was allotted for consumer advertising of the contest in addition to the company's normal advertising appropriation. The advertising has been shrewdly planned to attract interested people into dealers' showrooms to obtain information to help them win a part of the prize money.

Five thousand dollars in cash is offered as the first prize and $1,250 in cash as the second, with 36 DeLuxe and Standard model refrigerators for the best short letters on "What I Learned About Kelvinator." It was decided that best results could be obtained if efforts were concentrated within a comparatively short space of time. The 62 days between July 15 and Sept. 15 were chosen.

To insure wholehearted cooperation from retail salesmen, more than $18,000 was appropriated to be divided among men working in the company's 30 distributing organizations. These distributing organizations are divided into ten groups designated as Derby tracts with quotas of similar size. Each distributor becomes a "horse" on some one of the tracks. For each domestic sale, a salesman receives from one to eight Derby tickets on the "horse" which he is backing, this "horse" always being his own distributor. For each commercial sale or apartment house installation, he receives tickets according to dollar volume.

The total prize money is divided among the ten tracks in proportion to the sales organization in each track. On each track the organization making the highest percentage of its quota takes 50 per cent of the prize money, the second organization 30 per cent and the third 20 per cent. This prize money is then divided among the retail salesmen in the 30 winning organizations who cash all the tickets they have earned.

Reports at about midway point in the contest were that it was succeeding beyond expectations, and indications point to a definite achievement of the goal sought.

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HAS LUMBER COMPANY'S MOTOR ORDER—Contract for furnishing approximately $20,000 worth of motors and control apparatus to be installed in the pulp and paper mill at Longview, Wash., for the Weyerhauser Timber Co., has been secured by the Westinghouse Electric & Mfg. Co. The order includes 100 motors ranging from 200 hp. down.

NEW PRESIDENT HEADS SHERMAN CLAY & CO.—P. T. Clay, F. R. Sherman and F. W. Stephenson, respectively president, vice-president and secretary-treasurer of Sherman Clay & Co., with headquarters in San Francisco, have retired from active participation in the operation of the business of the company, and C. H. de Acres has been elected president and general manager. Mr. de Acres joined the company in July after resigning as vice-president and general manager of Lyon & Healy, Inc., Chicago. Messrs. Clay, Sherman and Stephenson will maintain their present ownership in the business and will continue on the board of directors. There is no change in the stock ownership, corporate structure or affiliation of the company. Piano and music merchants in California for many years, Sherman Clay & Co. recently took over northern California distribution of Kelvinator refrigerators.

Opening window display of Kelvinator refrigerators at the San Francisco store of Sherman Clay & Co., music dealers who recently took over Kelvinator distribution in northern California except in the Sacramento Valley. A miniature Ford airplane in the display window had three motors in action. In the window also were a Kelvinator DeLuxe Six model and a reproduction of the testimonial given by Commander Byrd, whose Antarctic expedition carried Kelvinator refrigeration

NORTHWESTERN MFG. CO., LTD., has opened a plant at 2781 West Fourth Ave., Vancouver, B.C., where they are engaged in the production of a complete line of electric refrigerators. This company also intends shortly to place on the market a new line of oil burners. Exclusive manufacturing and sales rights for the British Empire for refrigeration equipment have been secured by the company from the Parker Ice Machine Co. Both products will be marketed under the trade name of "Norwest." Already one shipment of refrigerators from the Vancouver plant has gone forward to New Zealand. Connections have also been made with Australia, South Africa and India. The company is also developing domestic trade throughout the Dominion. W. G. Wright is vice-president and general sales manager of the firm, with A. E. Downey as president and H. A. Downey as secretary-treasurer. D. K. Parker is manager and C. D. Robinson chief engineer. A. M. Campbell is in charge of the commercial sales division of the company.

SIERRA EQUIPMENT CORP. has moved its Seattle office and warerooms from 215 Second Ave. to 213 Main St. M. J. Corwin, vice-president, will continue in charge of sales activities in the Northwest. The company has recently been appointed distributor of the line of hotplates manufactured by Eugene Anthony Co., Seattle. Stocks will be carried at Sierra Equipment Corp. branches in Los Angeles, San Francisco and Seattle. Gardiner Metal Co., Chicago, manufacturer of resin-core and acid-core solders for electrical and radio use, has also appointed this company as its distributor in the eleven Western states.

LEMON ON OYSTERS—Electrical refrigeration has put a crimp in the R-in-the-month oyster theory. The Bureau of Fisheries at Washington came to the aid of oyster producers recently by discounting as "only a popular fallacy" the belief that oysters should be eaten only in the "R" months. J. M. Lemon, the bureau's oyster expert, said that this theory grew from the fact that oysters frequently spoiled in the summer before modern refrigeration was available.

NORTH WESIX ELECTRIC CO. moved its Portland office Aug. 1 from 430 Alder St. to 474 Glisan St. The company's office and warehouse are combined at the new location. C. W. La Rue is Oregon district manager.

W. R. HENDRY CO., Hoge Bldg., Seattle, on a bid of $18,000 offered low bid for furnishing 150,000 lb. of weatherproof copper wire to the City Light Dept. last month.

H. E. SANDERSON, Pacific Coast manager, Bryant Electric Co., returned to San Francisco in August from a sales meeting held at the headquarters of the company in Bridgeport, Conn.

New Products

Stryco Electric Heater

New electric fan heaters with high heat efficiency are being manufactured by Stone-Ryals Electric Co., 445 Natoma St., San Francisco.

The fan in these Stryco heaters constantly forces a large volume of air through the heater, bringing the entire air of the room in contact with the heating elements and thereby assuring an even distribution of heat. Motor and fan are designed especially for this heater, and give silent, dependable service. Stryco heaters are furnished in four attractive finishes and may be obtained in either 1,320 or 1,500 watts, 115 volts a.c. Retail price, $14.50.—ELECTRICAL WEST, Sept. 1, 1931.

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Electric Water Cooler

New electric water colers, suited in small models to the requirements of a small organization or private office and in larger models to the general office or small industrial plant, have recently been placed on the market by Frigidaire Corp., Dayton, Ohio. The model illustrated is equipped with a porcelain lined food and beverage compartment and is finished in metallic lacquer with chrome-plated hardware.—ELECTRICAL WEST, Sept. 1, 1931.

Electric Hot-Beds

A lead-sheathed resistance cable for ground heating is announced by the General Electric Co., Schenectady, N.Y. Regulated by a thermostat, the new cable allows any practical bed temperature to be selected and maintained.

In constructing an electric hot-bed, the lead-jacketed resistance wire is buried in the bottom of the bed in a series of parallel lines from 4 to 9 in. (usually about 7 in.) apart and looped at the ends of the box so that the wire is in one length. The thermostat control is buried in the soil and partly protruding into the air, thereby taking into account the effect of the sun's rays on the air in the bed. After the wire is placed in position, 5 or 6 in. of rich earth is placed on top and the hot-bed planted.

In addition to hot-bed uses, the new wire can be used for hot-house propagating benches. Similar wires in sizes larger than the No. 19 are available for outdoor installations and heavier duties. The price of the cable is 5c. per foot.—ELECTRICAL WEST, Sept. 1, 1931.

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Vest-pocket Lantern

A small, palm-size pocket lantern is being manufactured by Delta Electric Co., Marion, Ind. Weighing only 6 oz. with batteries installed, it can be carried in a vest pocket or a lady's purse. Operates on two standard 1-in. cells. List price, less batteries, 50 cents.—ELECTRICAL WEST, Sept. 1, 1931.

Hanging Reflector Lamp

A hanging indirect lighting unit known as the Invertashine No. A-256 has been developed by the Wuelker Reflector Lighting Corp., 231 Franklin St., San Francisco. The inside of the spun-aluminum reflector is finished with the patented "Wuelker Diffusion." Sprayed aluminum or colored enamel is used for the outside of the bowl. Easily detachable suspension wires permit the bowl to be dropped conveniently for bulb replacement. A 200-watt bulb is used in this fixture, which attaches to a 2¼-in. shadeholder.—ELECTRICAL WEST, Sept. 1, 1931.

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For Rough Handling

Bryant Electric Co., Bridgeport, Conn., has just brought out an armored cord-grip cap and a companion cord connector especially for use where cords are subjected to extraordinarily rough handling. Both are of brown composition, steel armored, cadmium plated, with $\frac{7}{16}$-in. cord hole.—ELECTRICAL WEST, Sept. 1, 1931.

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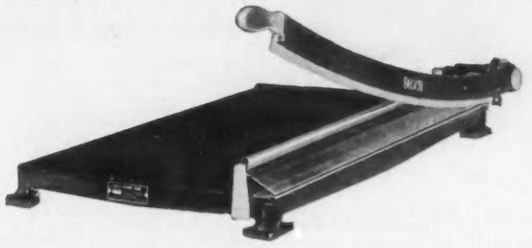
Trimming Board

An automatic hold-down clamp gives the operator full control of his work when cutting any thickness of paper or other fibrous material with a new trimming board manufactured by Bosch Products Co., 639 Mission St., San Francisco, and 370 Lexington Ave., New York.

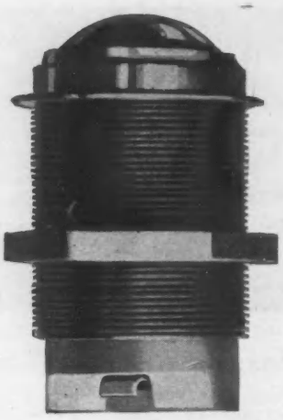
The automatic clamp actuates through the movement of the upper knife in advance of shearing. Thus a print is firmly held to the cutting edge for its full length before shearing begins. The clamped sheet is released, either before or after cutting has taken place, by an upward movement of the knife.

In substance, the hold-down feature of this device is equivalent to a third hand. It is further said to be possible, with the aid of the left hand, to draw and stretch the material to be cut while under tension of the hold-down clamp, which also may be varied by the movement of the hinged knife.

Being transparent, the clamp plate provides an ideal location for guide lines, which facilitate rapid and accurate trimming. Marginal allowances can be taken care of without stopping to lay out or measure them in advance of the trimming operation. A substantial working plane of laminated bakelite replaces the customary wooden or metal top. Engraved quadratic lines cover its entire surface, and there is a graduated scale in units of 1 in. at the top. The use of bakelite for the surface eliminates the nuisance so often caused by static electricity when prints fresh from the drier are placed on a wooden or metal surface. The cast metal frame is of substantial design. Blades are of best quality tool steel and are easily replaced.



Utilities should find this a useful tool for cutting photostats and blueprints, news clipping, and in auditing departments. The cutting blade is 26 in. in length, but sheets several times the length of the blade can be trimmed with this cutter.—ELECTRICAL WEST, Sept. 1, 1931.



Visual Signal Unit

A bullseye visual signal unit that is in itself a complete annunciator, consisting of a light chamber, terminal block, socket, lense cap and a symbol insert, is being marketed by the H. R. Kirkland Co., 70 East 45th St., New York, and distributed by the Graybar Electric Co.

The Kirkland Bulls-i-unit is designed for all kinds of visual signal work, particularly in the construction of lamp annunciators. The unit is adaptable to all kinds of control devices, panel boards, pilot lights, elevator signals, for hospital signal systems, automobile dashboard signal lights, marine and railroad signals, special advertising signs, house numbers, etc. It is installed by merely inserting the unit in a 1⅜-in. hole and locking it in place with the holding nut.—ELECTRICAL WEST, Sept. 1, 1931.

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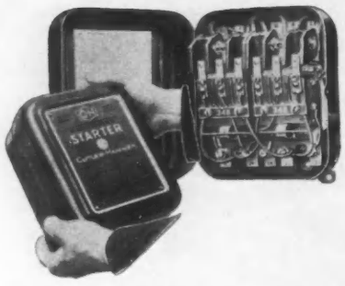
Reversing Starter

The development of a new across-the-line type reversing starter for d.c. and a.c. polyphase motors up to 3 hp. is announced by Cutler-Hammer, Inc., 234 N. 12th St., Milwaukee, Wis. These new starters are designed for use with motors on hoists, lifts, garage doors, small machine tools and other equipment where a half-time, intermittent-duty reversing starter is required. Reversing is accomplished by means of two mechanically interlocked magnetic contactors controlled from a remote point by means of a separate push-button master station.

Over-all size of this new starter is 7 1/16 x 8 7/16 x 4 7/16 in. It has a maximum capacity of 1 hp. and is furnished in two types: Type SRA is arranged for two-wire control only. Type SRB can be used for either 2- or 3-wire remote control. Blow-outs are provided to give maximum capacity of 3 hp.—ELECTRICAL WEST, Sept. 1, 1931.



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Light-weight Suspension Clamps

Light-weight suspension clamps suited to ACSR conductor with armor rods and other conductor of comparable size requirements are being manufactured by Ohio Brass Co., Mansfield, Ohio. The new line will accommodate all conductor sizes from 2/0 to 795,000-circ.mil. While conforming to the general design principles of other O-B clamps, these have added advantages. —ELECTRICAL WEST, Sept. 1, 1931.

Internal Growler

For testing stators and armatures for short circuits without disturbing connections, the P. E. Chapman Electrical Works, 1820 Chouteau Ave., St. Louis, Mo., has developed the Chapman Size 1 internal growler. Weighing but 3½ lb., this growler will test stators ⅛ to 15 hp., fan stators to 50 hp., and armatures in proportion. The device is rated at 115 volts, 60 cycles, 100 watts, 2 amp., 1 phase; it is powerful enough to force an appreciable amount of current throughout multiple windings, producing phantom poles around the stator. List price, f.o.b. St. Louis, $25. —ELECTRICAL WEST, Sept. 1, 1931.

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Insect Eliminator

Reynolds Electric Co., Chicago, has developed a special natural colored glass hood for placing over white lamps to repel insects at night. The hoods are obtainable in a green or amber color, through which maximum light transmission is assured, the manufacturer states.—ELECTRICAL WEST, Sept. 1, 1931.

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Photoflash Lamp Reflector

A folding reflector for use with the Photoflash lamp has been brought out by The Miller Co., of Meriden, Conn. Known as the "Fold-O-Flector," the new reflector is 19 in. in diameter and folds into a compact size. It may be used with one lamp or seven lamps by means of a clip arrangement. Light rays emitted from the center lamp fire the extra lamps, the battery thus being only used to fire one lamp. The lamps are so arranged that they center in one central mass so that when extra lamps are used the full value of them is more nearly approximated. The equipment has been tested and approved by engineers of the General Electric Co. at Nela Park. Retail price of the outfit including three lamp clips is $7.80; extra clips, 20c. each.

Illustrated is the "Fold-O-Flector Junior." The junior, in which one, two or three lamps may be used at a time, is 13 in. long and 10 in. wide. Folded, it fits easily into the pocket. Retail price, without batteries or photoflash lamps, $1.80. ELECTRICAL WEST, Sept. 1, 1931.

Pocket-size Level

Designed for leveling where height adjustments are to be made in installing floor distribution systems, a pocket-size Universal Level is now made by National Electric Products Corp., Pittsburgh, Pa. Horizontal planes may be leveled in all directions with the device, making it useful in workshops, offices, and homes.—ELECTRICAL WEST, Sept. 1. 1931.

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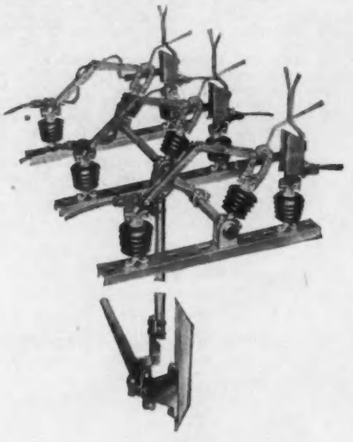
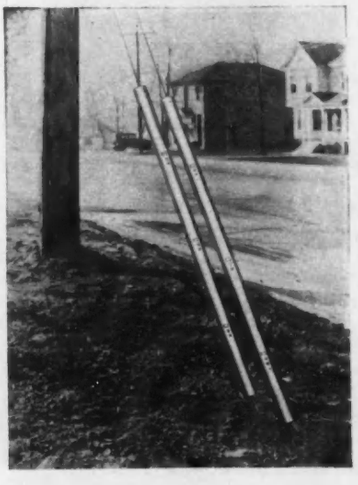


Pole-top Switch

James R. Kearney Corp., St. Louis, Mo., announces a compact, light-weight pole-top gang-operated switch of reasonable price, so assembled that minimum installation and aligning work is needed. Furnished in 2-, 3-, or 4-pole units. A full, round guy-guard which completely covers all bolt and strand ends, leaving no sharp edges exposed, has also been brought out by this company. The guard provides full ventilation, yet allows minimum moisture collection.—ELECTRICAL WEST, Sept. 1, 1931.



Thermostatic Mixing Valve

The Wilcolator Mix-O-Stat, recently developed by The Wilcolator Co., Newark, N.J., is designed to deliver water at a constant temperature regardless of heat variations of the hot or cold water supply. Changes in temperature of the hot or cold water supply actuate the thermostat before the water reaches the mixing chamber, resulting in less waste of hot water as it is delivered at a useable temperature.

A special advantage of this mixing valve is that it allows off-peak power rates to be used to advantage in hot water storage systems by making it possible for hotter water to be stored. A simple adjustment provides a wide range of mixed water from tepid to the maximum hot water temperature.—ELECTRICAL WEST, Sept. 1, 1931.

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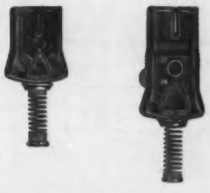

Screwless Heater Plugs

A line of screwless heater plugs is being made by the Arrow Electric Division of The Arrow-Hart & Hegeman Electric Co., Hartford, Conn. By devising a means of holding the two parts of a plug together with spring clips, this company has eliminated the trouble caused by the loosening of holding screws due to alternate heating and cooling and mechanical strains. The spring clips in these Arrow heater plugs is self-adjusting to temperature changes, sudden yanks and twists. It always keeps the bakelite sections firm and tight, according to the manufacturer. Retail prices are 18c. for the switchless plug and 44c. for the switch plug.—ELECTRICAL WEST, Sept. 1, 1931.

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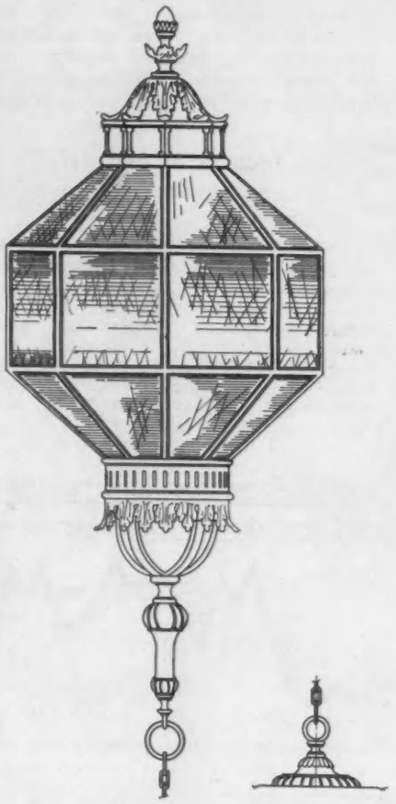
150-Watt Tubular Lamp

Recent demands created by designers of modern architecture have resulted in the manufacture by the incandescent lamp department of the General Electric Co. of a 150-watt tubular bulb Mazda lamp with a medium screw base. The lamp's diameter is 1¼ in. Its over-all length is 11⅞ in.; the filament, occupying the greater length of the bulb, is 9 in. It may be burned in either base down or horizontal positions.

The straight line of light produced by this type of lamp is desirable for many lighting requirements of architectural schemes. It is suitable for producing uniform illumination for exterior and interior opal glass panels. Other applications may be for luminous columns, large torchieres, art galleries, transparent interior signs, and large wall or floor display cases. Under some conditions it is adaptable for cove lighting, island show windows, footlights for show windows, etc.—ELECTRICAL WEST, Sept. 1, 1931.

Lighting Unit for Large Interiors



The Holophane Co., Inc., New York, has introduced a semi-indirect ornamental and dust resisting lighting unit, designated as the L-1000, for large lamps. It is made in the shape of an octagonal lantern composed of 25 specially designed refracting plates held in a suitable frame with an internal prismatic reflector. The fixture is made in three architectural styles and takes from 500 to 1,500-watt lamps. It is 32 in. wide and from 4 to 5 ft. long depending upon the design, and is intended for use in interiors of monumental dimensions or character.

All prisms are on the inside with the outside surfaces smooth. Access to the inside of the unit is gained through a hinged section of the middle tier of lenses. Relamping and internal cleaning are done through this opening. The fixture is made of bronze and can be supplied in either painted or polished finishes.

Controlled light distribution is accomplished through the cooperation of the internal reflector with the outer lenses.—ELECTRICAL WEST, Sept. 1, 1931.

Trade Literature

¶ SPEED REGULATORS AND RESISTORS—Bulletins Nos. 1101 and 1102, issued recently by Ward Leonard Electric Co., Mount Vernon, N.Y., describe that company's speed regulators designed for use with constant torque and variable torque a.c. and d.c. fractional horsepower motors. Bulletin No. 19 gives information on the company's Ribflex vitreous enameled resistance units. Price lists are included.

¶ TURBINE CATALOG—S. Morgan Smith Co., York, Pa., has issued a new catalog (No. 123A) descriptive of the Smith-Kaplan automatically adjustable blade turbine. Copies may be obtained upon written application to the company on business letterhead.

¶ PANELBOARDS—The Switch and Panel Division of the Square D Co., 6060 Rivard St., Detroit, has announced the publication of a new bulletin, No. CA505A, describing its new shallow-type safety panelboard. The bulletin contains price lists of the equipment in a wide range of capacity.

¶ "MODERN ERA"—This is the name of a home publication, the first issue of which is now being distributed by Frigidaire Corp., Dayton, Ohio. Fiction, studies in low-cost menus, summer desserts for children, information on child welfare, cross word puzzles and other features are carried in the first number.

¶ SYNCHRONOUS MOTORS — Descriptive matter, application data and dimension charts covering its flywheel-type and six other standard types of synchronous motors, are given in bulletin No. 520 just issued by The Ideal Electric & Mfg. Co., Mansfield, Ohio.

¶ TUBULAR AIR HEATERS—This is the subject of a new bulletin issued by The Babcock & Wilcox Co., 85 Liberty St., New York. Tubes, plates, casing, etc., are fully described and illustrated and typical installation views and setting plans are shown, demonstrating the adaptability of the air heater to various types of boilers.

¶ RIGID CONDUIT—Of interest and value to architects, electrical engineers, contractors and inspectors is a critical history of the development of rigid conduit which has recently been published by the trade extension committee, Rigid Conduit Section, National Electrical Manufacturers Assn. Copies of the report may be secured by writing to George H. Sicard, secretary, Rigid Conduit Section, Utica, N.Y.

¶ ARC WELDING—The process of arc welding bar joists in mill buildings is described in a recent bulletin of The Lincoln Electric Co., Cleveland, Ohio.

¶ HOTPOINT PRICE LIST—An illustrated retail price list of Hotpoint appliances, effective July 1, 1931, has just been issued by the Appliance Division of the Edison General Electric Appliance Co., Chicago.

¶ UNDERFLOOR DUCT—A history of the development of the underfloor duct system manufactured by Walker Bros., 12 East 41st St., New York, is presented in a booklet released by them in July.

¶ G.E. PUBLICATIONS—Recent publications of the General Electric Co., Schenectady, N.Y., include the following:

GEA-1369: Outdoor Horn-Gap Switches

GEA-305A: Portable Instruments

GEA-1414: Busbar Clamps

GEA-1360: Galvanized Hinge Pipe Fittings

GEA-1375: Watthour Demand Meters

GEA-702B: Automatic Telemetering Equipment

GEA-1410: Portable A.C. Test Kits and Current-Measuring Sets

GEA-1391: Carrier-Current Signal Equipment for Unattended Substations

GEA-1413: Electric Equipment for Foundries

GEA-1114A: Solenoid-Operated Valves for the Remote Control of Liquids and Gases Under Pressure

GEA-602A: Electrical Instruments Catalog, 1931

GEA-606C: Industrial Control Catalog, 1931

GEA-77D: Capacitors for Power-Factor Correction

GES-402B: Motion Pictures and Illustrated Lectures

GEA-1361-A: Electric Tachometer for Aircraft Engines

GEA-1227A: Light That Brings Business at Night

GEA-55C: Round-Pattern Switchboard Instruments

GEA-900C: Test Blocks and Plugs

GEA-1096B: Indoor Disconnecting Switches

GEA-857B: Outdoor Fuse Disconnecting Switch

GEA-584C: Totalizing Recording Instruments, Remote Indicators and Remote Recorders

GEA-1433: Rectangular Switchboard Instruments

GEA-1187C: Aircraft Engine Temperature Indicator

Barometer

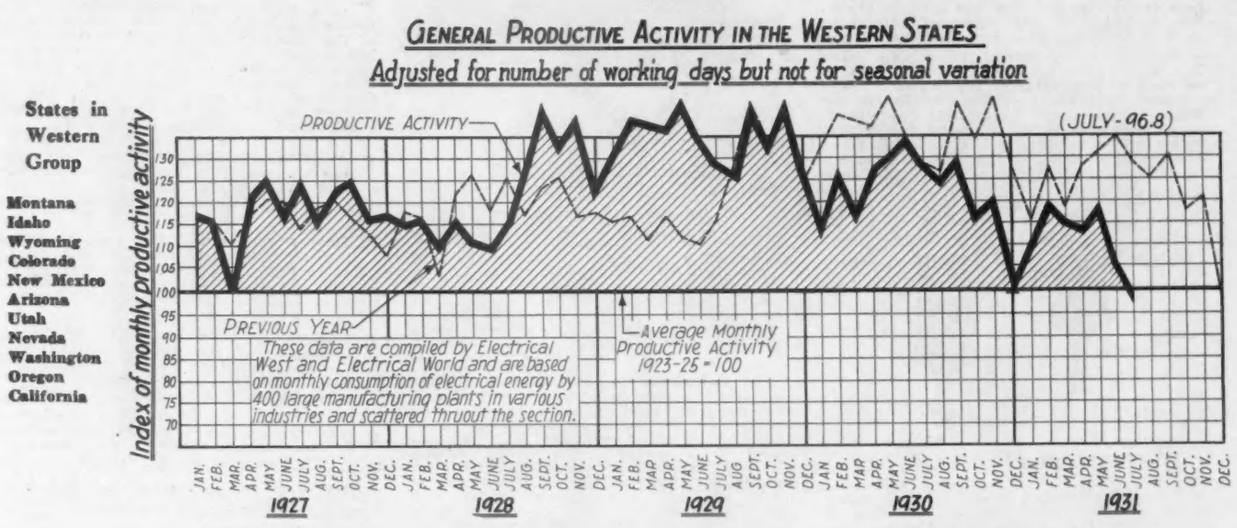
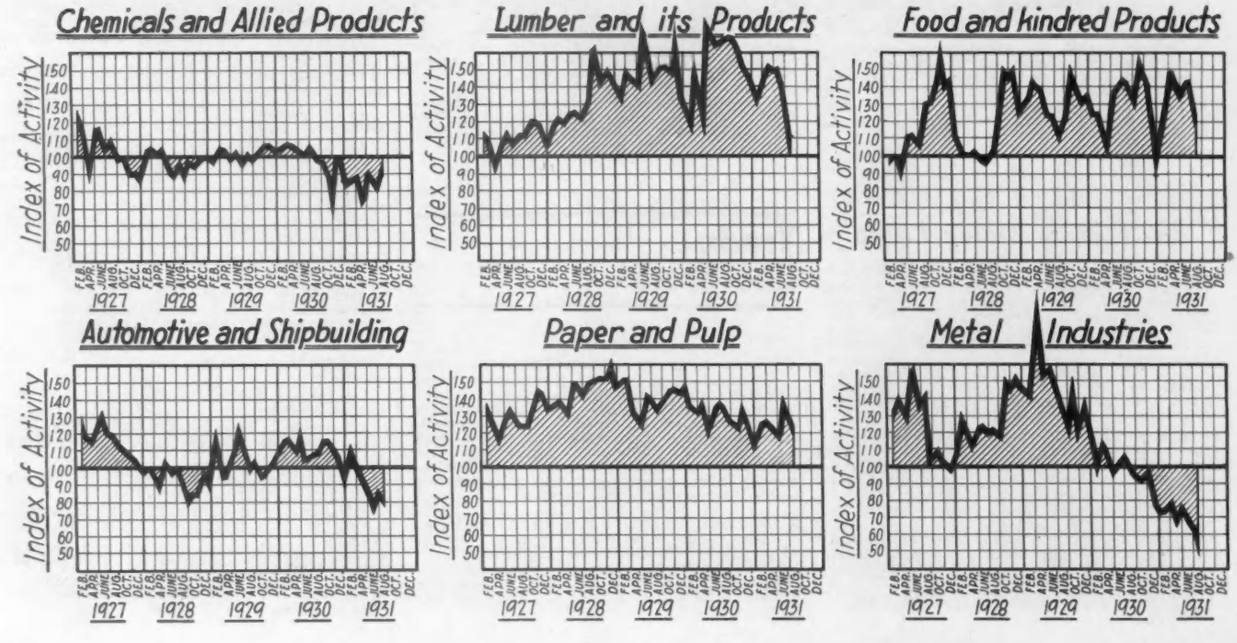
INDUSTRIAL activity in the West, as indicated by reports of electrical energy consumption by individual establishments in various kinds of manufacturing, decreased 10 per cent in July compared with June and was 25 per cent lower than in July of last year. The level is about the same as that of the summers of 1924 and 1925, and slightly below the lowest point reached last winter.

In the latter respect the situation differs little from that prevailing in the United States as a whole, with this difference: A decided sag in mid-summer in the country as a whole is not abnormal; in the West it is unusual.

The decrease in the West was general; the only increase was in the chemical industry, which, however, is down 10 per cent from 1930. In food products, which elsewhere rose to the highest peak yet attained, the Western decline is exceptional. But even here a parallel is found: The production of commodities for domestic consumption has everywhere been far more active than most other lines, and in the Western food industry even the lower July figure remains above that for the corresponding month in every year except 1927 and 1930.

The lower index numbers in lumber, the metal industries and the stone-clay-glass group evidently reflect the nationwide lack of activity in new construction.

Indexes of Industrial Activity in the Western States

(All figures adjusted for number of working days.)

	July 1931	June 1931	May 1931	July 1930	Average First Seven Months 1931	Average First Seven Months 1930
All industry	96.8	106.4	119.1	129.0	111.8	126.0
Chemicals	87.8	78.0	90.2	97.5	81.6	105.7
Food	125.5	145.4	144.8	139.2	139.6	132.3
Forest products	110.4	139.0	69.7	167.8	155.2	141.2
Metals group	47.8	60.8	154.1	96.8	65.7	102.5
Paper and pulp	124.2	132.4	143.3	130.7	129.9	133.2
Rubber	146.0	151.9	166.0	154.0	157.8	167.0
Shipbuilding	77.8	80.5	74.5	109.8	89.0	113.3
Stone, clay and glass	82.8	89.5	80.2	104.9	91.7	100.9